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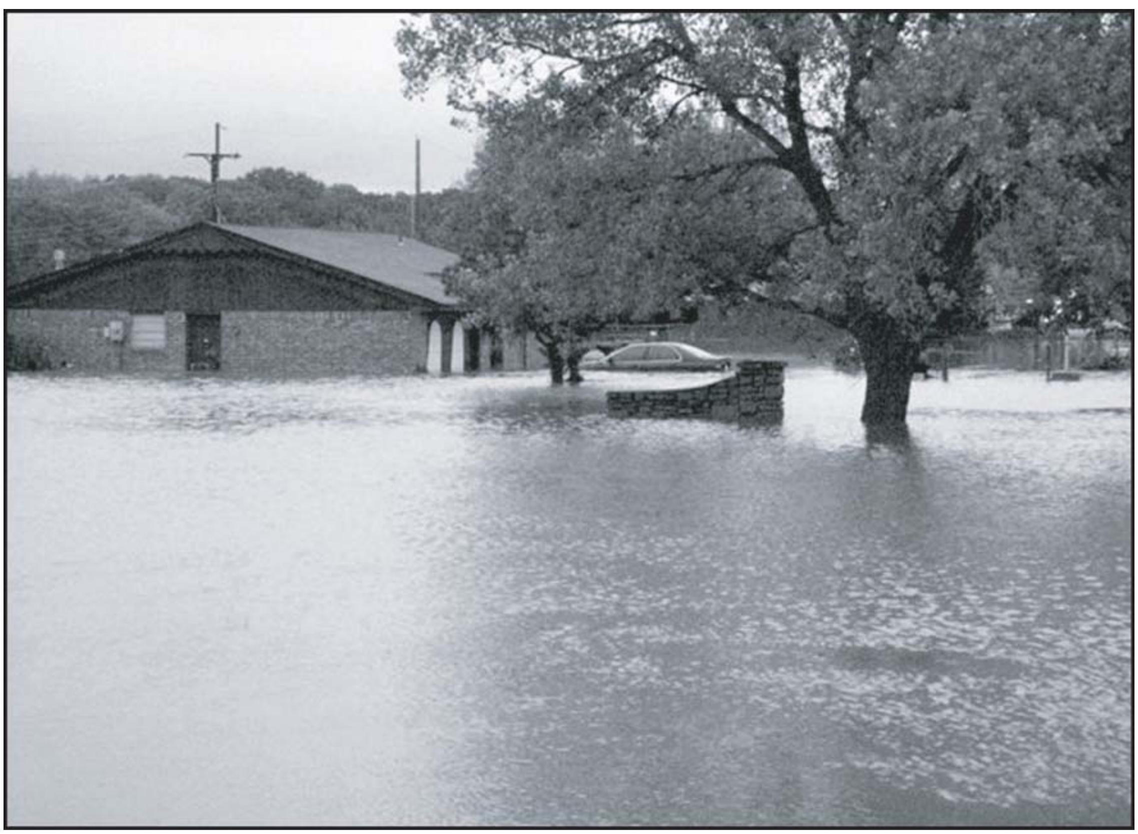
OKLAHOMA DEPARTMENT OF TRANSPORTATION

Flood Frequency Estimates and Documented and Potential Extreme Peak Discharges in Oklahoma

Water-Resources Investigations Report 01–4152



U.S. Department of the Interior
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Cover: Photograph was taken October 23, 2000, during the Apache, Oklahoma, flood. Photographer: Stanley Wright, The Apache News.

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Conversion Factors and Datum

Multiply	By	To obtain
	Length	
inch (in.)	25.4	millimeter (mm)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

Vertical coordinate information is referenced to North American Vertical Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to North American Datum of 1983 (NAD 83).

Sea level: In this report “sea level” refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Flood Frequency Estimates and Documented and Potential Extreme Peak Discharges in Oklahoma

By Robert L. Tortorelli and Lan P. McCabe

Abstract

Knowledge of the magnitude and frequency of floods is required for the safe and economical design of highway bridges, culverts, dams, levees, and other structures on or near streams; and for flood plain management programs. Flood frequency estimates for gaged streamflow sites were updated, documented extreme peak discharges for gaged and miscellaneous measurement sites were tabulated, and potential extreme peak discharges for Oklahoma streamflow sites were estimated. Potential extreme peak discharges, derived from the relation between documented extreme peak discharges and contributing drainage areas, can provide valuable information concerning the maximum peak discharge that could be expected at a stream site. Potential extreme peak discharge is useful in conjunction with flood frequency analysis to give the best evaluation of flood risk at a site.

Peak discharge and flood frequency for selected recurrence intervals from 2 to 500 years were estimated for 352 gaged streamflow sites. Data through 1999 water year were used from streamflow-gaging stations with at least 8 years of record within Oklahoma or about 25 kilometers into the bordering states of Arkansas, Kansas, Missouri, New Mexico, and Texas. These sites were in unregulated basins, and basins affected by regulation, urbanization, and irrigation.

Documented extreme peak discharges and associated data were compiled for 514 sites in and near Oklahoma, 352 with streamflow-gaging stations and 162 at miscellaneous measurements sites or streamflow-gaging stations with short record, with a total of 671 measurements.The sites are fairly well distributed statewide, however many streams, large and small, have never been monitored.

Potential extreme peak-discharge curves were developed for streamflow sites in hydrologic regions of the state based on documented extreme peak discharges and the contributing drainage areas.

Two hydrologic regions, east and west, were defined using 98 degrees 15 minutes longitude as the dividing line.

Introduction

Knowledge of the magnitude and frequency of floods is required for the safe and economical design of highway bridges, culverts, dams, levees, and other structures on or near streams. Flood plain management programs and flood-insurance rates also are based on flood magnitude and frequency information. A flood is any relatively high streamflow overtopping the natural or artificial banks in any reach of a stream (Leopold and Maddock, 1954, p. 249-251). The magnitude of a flood is referred to as the flood peak, which is the highest value of the discharge or stage attained by a flood; thus, peak discharge or peak stage (Langbein and Isseri, 1960, p.10). Three kinds of flood frequency analyses may be conducted; (1) peak discharge; (2) peak stage; and (3) total volume (Dalrymple, 1960, p. 5). Peak-discharge flood frequency analyses are the most common and are the type of flood frequency analyses that will be presented in this investigation.

Documented historical peak-discharge data are valuable for giving perspective to flood potential for local communities near a streamflow-gaging site. Often very large floods happened so long ago that people have forgotten or are unaware that the floods happened and could happen again. These documented peak discharges may be much larger than large damaging streamflows that have recently occurred.

The potential extreme peak discharge at a site, which is an estimate of the maximum expected peak discharge that could occur at a stream site, is used in conjunction with flood frequency analysis to give the best evaluation of flood risk at a site. Extreme flood potential exceeds the discharge associated with large recurrence-interval flood, such as the 100-year peak discharge (Asquith and Slade, 1995). Potential extreme peak-discharge curves, derived from the relation between documented extreme peak-discharge measurements and contributing drainage areas from a hydrologic region, are not associated with specific probabilities or frequencies, but give evidence as to the magnitude of flow that has occurred and can occur. Given similar basin characteristics, a peak lying close to the envelope curve might occur at other basins in the same region (Crippen, 1982). The U. S. Geological Survey (USGS), in cooperation with the Oklahoma Department of Transportation, conducted an investigation to define the potential extreme peak discharges in Oklahoma.

Purpose and Scope

The purpose of this report is to: (1) update flood frequency estimates for gaged streamflow sites with 8 years or more of record for unregulated, regulated, and urban basins in and near Oklahoma, using data through 1999 water year; (2) present documented extreme peak discharges for gaged and miscellaneous measurement sites; (3) present potential extreme peak-discharge curves for unregulated basins for the state; and (4) present potential extreme peak-discharge estimates for all the streamflow measurement sites used in this investigation.

The potential extreme peak-discharge curves were developed based on documented extreme peak-discharge measurements from 352 streamflow-gaging stations in Oklahoma and within about 25 kilometers of Oklahoma in the bordering states of Arkansas, Kansas, Missouri, New Mexico, and Texas (fig. 1; table 1, back of report); and 162 sites in Oklahoma at miscellaneous measurement sites without streamflow-gaging stations, or streamflow-gaging stations with short record (fig. 2; table 2, back of report). The peak-discharge measurements presented are from unregulated basins, and basins affected by regulation, urbanization, and irrigation. An unregulated basin is defined as a drainage basin for which the peak discharges are not affected by regulation, reservoirs, diversions, urbanization, or other human-related activities. Significant regulation by dams or other manmade modification of streamflow is defined as 20 percent or more of the contributing drainage basin being affected (Heimann and Tortorelli, 1988).

This report updates the flood frequencies presented in Heimann and Tortorelli (1988). This update can be used to estimate flood discharges for Oklahoma streamflow-gaging sites with a drainage area greater than 2,510 square miles, because it includes 15 years of additional annual peak data and records from many additional gaging stations, including major peak discharges recorded during 1987, 1990, 1993, and 1995 water years. This report also includes and updates the flood frequencies in Tortorelli (1997), which estimated flood discharges for Oklahoma streamflow-gaging sites with drainage areas less than or equal to 2,510 square miles.

This report also updates the potential extreme peak-discharge analysis by Crippen and Bue (1977) for Oklahoma.

Acknowledgments

The following U.S. Geological Survey personnel provided assistance with this report: Darrell Walters and Tony Coffey provided accurate and valuable information about historic streamflow-gaging data; William Asquith provided guidance about the investigation methodology; and Michael Stallings and Jason Masoner produced the streamflow-gaging station site maps.

Flood Frequency Estimates for Gaged Streamflows

The curvilinear relation between flood peak magnitude and annual exceedance probability or recurrence interval is referred to as a flood frequency curve. Annual exceedance probability is the probability of a given flood magnitude being equaled or exceeded in any one year. Recurrence interval is the reciprocal of the annual exceedance probability, and represents the average number of years between peak flow exceedances of that magnitude. For instance, a flood having an annual exceedance probability of 0.01 has a recurrence interval of 100 years. This does not imply that a 100-year flood peak will be equaled or exceeded each 100 years, but that it will be equaled or exceeded on the ***average*** of once every 100 years (Thomas and Corley, 1977). That peak might be exceeded in successive years, or more than once in the same year. The probability of that peak happening is called risk. Procedures for making flood risk estimates are given by the Interagency Advisory Committee on Water Data (IACWD) (1982).

The IACWD (1982) provides a standard procedure for flood frequency estimation using the log-Pearson Type III (LPIII) distribution. The procedure uses systematically collected and historical peak-discharge values to define frequency distribution. The shape of the distribution is defined by a skew coefficient used in the estimation procedure.

The LPIII distribution does not always define a suitable distribution of peak-discharge values because of variation in the climatic and physiographic characteristics in the basin. The data distribution is defined by Weibull plotting positions (Chow and others, 1988). An inappropriate fit of the LPIII distribution to the distribution of peak-discharge data can produce erroneous values for flood frequency. Therefore, for the estimation of flood frequency in this investigation, available historical flood information, low-outlier thresholds, and skew coefficients were all considered, following the IACWD guidelines. LPIII flood frequency estimates of the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year floods are given for each gaged station used in this investigation in table 1 (back of report).

Annual Peak Data

All pertinent annual peak-discharge data were collated and reviewed to begin the flood frequency analysis. This review of data eliminated discrepancies across state lines and accounted for data in the immediate bordering areas of a state with similar hydrology.

The station flood frequency analysis presented is based on annual peak-discharge data systematically collected at 352 gag-

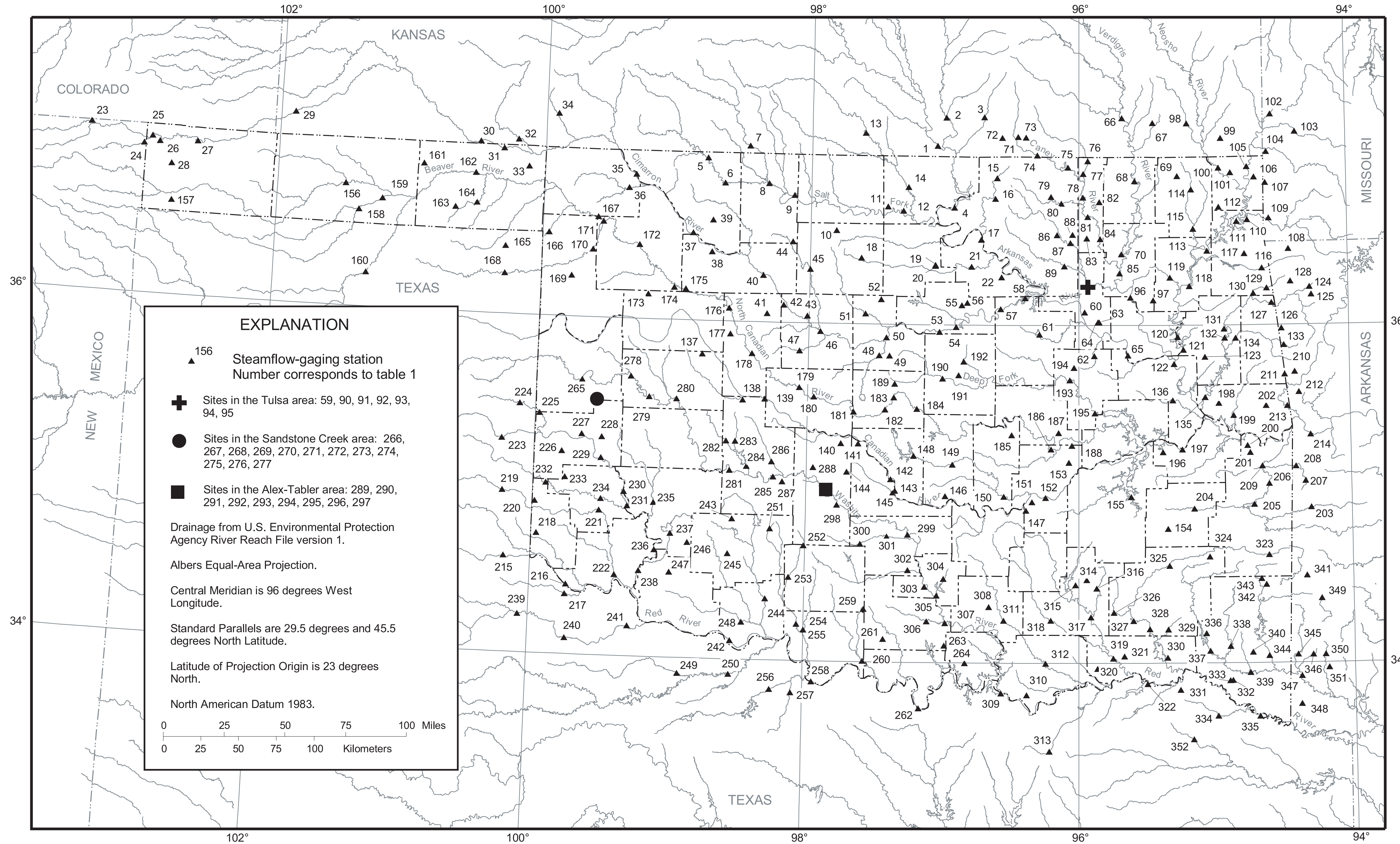

Figure 1. Location of streamflow-gaging stations with at least 8 years of peak discharge data used in study.

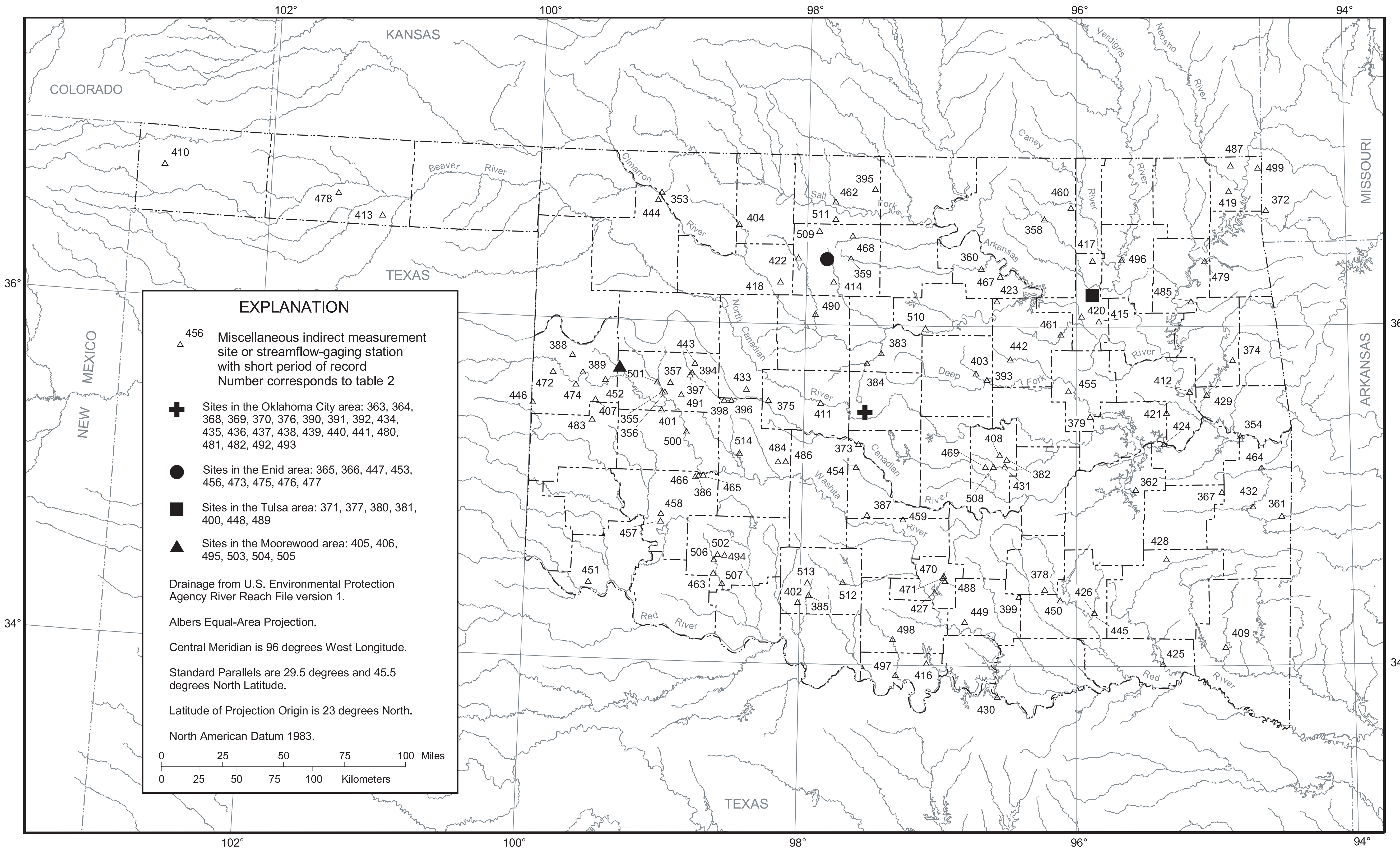

Figure 2. Location of miscellaneous indirect measurement sites and streamflow-gaging stations with short periods of record used in study.

ing stations (fig. 1; table 1, back of report). Those data were based on a water year, October 1 through September 30. Those data were collected through September 30, 1999, for all stations used in this investigation. Only those stations with at least 8 years of flood peak data were used in the analysis. The IACWD (1982) recommends using at least 10 years of data to make these calculations. The only time stations with less than 10 years of data were used was to fill regional gaps; twelve crest-stage partial record sites (sites 16, 40, 79, 110, 117, 144, 198, 200, 218, 247, 314, 324) and eight continuous record sites (sites 61, 136, 165, 191, 283, 285, 291, 342) (fig.1: table 1, back of report).

All station data were divided into appropriate periods of record, those periods in which the basins were unregulated, and those periods in which there were substantial effects from regulation by major dams or floodwater retarding structures and other manmade modifications. Therefore, each basin condition was analyzed separately if 8 or more years of record were available.

Historical Peak Discharges

In addition to the systematically collected peak-discharge data from gaging stations, the USGS routinely compiles, through newspaper accounts and interviews with local residents, information about historical peak discharges and historical peak stages, so that historical peak elevations can be determined for sites or times without measured data. A historical peak discharge is the highest peak discharge since a known date and may precede the installation of the station; a historical peak discharge can occur either before or after installation of a station. Historical information is critical for evaluating flood frequency estimates for the larger recurrence intervals. Many historical peak discharges are associated with catastrophic storms. Large storms can cause flood peaks exceeding those that can be estimated accurately by analyses of available precipitation or annual peak-discharge data.

Historical peak-discharge data also are valuable for giving perspective to flood potential for local communities near a streamflow-gaging site without the need to attach a statistical meaning to the flood. Often very large peak discharges, both historical peak discharges and systematically collected peak discharges, have occurred so long in the past that people have forgotten or are unaware that the floods have occurred. These peak discharges may be much larger than recent large notable floods. For example, the residents of Blackwell, Oklahoma, experienced a large flood on the Chikaskia River (site 14, fig.1; table 1, back of report) with a peak discharge of 60,700 cubic feet per second on November 1, 1998, when the river rose about 31 feet in less than two days. However, historic records show that there have been larger peak discharges. The largest is a historical peak discharge of 100,000 cubic feet per second on June 10, 1923, before the streamflow gage was installed. The second largest flood was on June 22, 1942, after the gage was installed, when the peak discharge was 85,000 cubic feet per second, almost 50 percent more flow than the 1998 flood; three other peak discharges exceeded the 1998 peak discharge.

Historical peak-discharge data are available for over 20 percent of the 352 Oklahoma and border-state stations. These peaks are designated with an “H” in table 1 (back of report). Historical peak discharge is included in frequency estimates by the specifying of a high-outlier threshold and historical record length according to guidelines in the IACWD (1982).

Historical information from nearby streamflow gages was used for a small number of stations, including time of large peaks and period of record. These stations are indicated by the footnotes in table 1 (back of report). For many of these stations, usually those with short periods of record, one gage-recorded peak discharge is historically important because it is considerably greater than the other peak discharges. Although no official documentation of the historical importance of that peak discharge is available, a historical perspective was developed through consideration of a longer period of record from relevant nearby stations. Such consideration was necessary to produce more realistic flood frequency analyses for these stations.

Low-Outlier Thresholds

The climatic and physiographic characteristics of some streams in Oklahoma result in extremely small annual peak-discharge values, referred to as low outliers. Typically, low outliers are identified by visually fitting the data to the LPIII distribution curve. The presence of low outliers can substantially affect the distribution curve; therefore, the fit of the LPIII distribution to the data should be adjusted to account for the presence of low outliers. All peak-discharge values below the low-outlier threshold, including zero, are excluded from the fitting of the LPIII distribution.

The IACWD (1982) guidelines provide a computational procedure for low-outlier threshold selection; however, the IACWD procedure may not produce accurate low-outlier thresholds for some stations. Therefore, the fit of the preliminary LPIII distribution to the distribution of the peak-discharge data for each station was visually inspected and some stations were assigned a revised low-outlier threshold based on that inspection.

Skew Coefficients

The IACWD (1982) guidelines recognize three types of skew coefficients: (1) the station skew coefficient calculated from only the systematic record with appropriate adjustments for high and low outliers, if applicable; (2) the generalized skew coefficient from a locally developed generalized skew map or the IACWD (1982) generalized skew map; and (3) the weighted skew coefficient, calculated by combining the locally developed generalized skew or the IACWD (1982) generalized skew with station skew coefficients.

The station skew coefficient is difficult to estimate reliably for stations with short periods of record. The IACWD (1982) recommends applying a weighted skew coefficient to the LPIII distribution. The weighted skew coefficient estimate is calculated by weighting the skew coefficient computed from the peak-discharge data at the station (station skew) and the generalized skew coefficient representative of the surrounding area. A weighted skew coefficient is based on the inverse of the respective mean square errors for each of the station and generalized skew coefficients.

Generalized skew coefficients were determined for Oklahoma (Tortorelli and Bergman, 1985) using adjusted station skew coefficients from stations with at least 20 years of peak-discharge data, streamflow data through 1980, and drainage basin areas greater than 10 square miles and less than or equal to 2,510 square miles. Tortorelli and Bergman (1985) updated the generalized skew coefficients recommended by the IACWD (1982), based on data through 1973. Updating the 1985 Oklahoma generalized skew map was not part of this project. However, a check of the standard error of the generalized skew, using the stations used to develop the generalized skew map and updated streamflow records through 1995, indicated that the standard error value of 0.33 was still valid (Tortorelli, 1997). That standard error value was used to compute weighted skew coefficients using the station and Oklahoma generalized skews for all unregulated basins (designated with a “N” in table 1, back of report) with contributing drainage areas ***less than or equal to*** 2,510 square miles.

The IACWD (1982) weighted skew coefficients were used for all unregulated basins (designated with a “N” in table 1, back of report) with contributing drainage areas ***greater than*** 2,510 square miles.

Weighted skew coefficients are not appropriate for stations for which there has been significant effects from regulation by major dams or floodwater retarding structures and other man-made modifications. The station skew coefficient was calculated from only the systematic record with appropriate adjustments for high and low outliers, if applicable, for these types of basins (designated with an “R, U, or I” in table 1, back of report).

Documented Extreme Peak Discharges

The USGS has monitored and published streamflow data for almost 100 years at streamflow-gaging stations throughout Oklahoma, including compilation of annual peak discharges. The USGS also determines peak discharges for large floods at sites without streamflow-gaging stations, through indirect measurements at miscellaneous streamflow measurement sites. Qualifications are assigned to the peak discharges that document the nature of each peak discharge and provide information regarding regulation, reservoirs, land use, and other characteristics affecting the discharge values.

The documented extreme peak discharge was tabulated for each of 352 sites with streamflow-gaging stations (table 1, back of report). The site number, USGS station number, USGS station name, type of station, type of record, date and magnitude of the documented extreme peak discharge, magnitude of potential extreme peak discharge (described in next section), contributing drainage area, latitude and longitude of station, hydrologic region, type of basin, and LPIII flood frequency estimates (described in previous section) are presented in table 1. If the documented extreme peak discharge was described in a flood report, that report is noted by a footnote. If a station had more than one type of record, all are presented.

The documented extreme peak discharge also was tabulated at each of 162 selected sites in Oklahoma at miscellaneous measurement sites without streamflow-gaging stations or with streamflow-gaging stations with short periods of record (table 2, back of report). These data were tabulated by visually inspecting the indirect streamflow measurement files at District office. Some have been reported as a historical peak in table 1 and were not repeated in table 2. Many of these peak discharges are associated with catastrophic storms and represent some of the largest peak discharges for the corresponding contributing drainage areas in the state. The descriptive information listed in table 2 is the same as in table 1, except that table 2 lists stream name or indirect measurement site name in place of USGS station name. A USGS station number was noted only on those sites that had a streamflow-gaging station. No LPIII flood frequency estimates were computed. If the documented extreme peak discharge was reported in a flood report, that report is noted by a footnote. If a station had more than one type of record, all are presented.

The sites are fairly well distributed statewide, however many streams, large and small, have never been monitored. The location of each site with streamflow-gaging stations is shown on figure 1. The site numbers on the figure refer to those in table 1, back of report, for sites 1-352. The location of each site without streamflow-gaging stations or streamflow-gaging stations with short periods of record is shown on figure 2. The site numbers on the figure refer to those in table 2, back of report, for sites 353-514. The distribution of the documented peak-discharge measurements from these sites is listed in table 3. A total of 671 streamflow measurements were used from the 514 sites.

Potential Extreme Peak Discharges

The documented extreme peak discharges were analyzed to estimate the potential extreme peak discharges for Oklahoma. Curves enveloping the documented extreme peak discharges for different regions of the state were developed as a function of the corresponding contributing drainage areas of the streamflow measurement sites. The relation between documented extreme peak discharge and other basin characteristics, such as channel length and channel slope, were evaluated by Asquith and Slade (1995). They reported that the potential extreme peak discharge correlates better with contributing drainage areas than with other characteristics. Crippen and Bue (1977) and Paul Jordan (USGS, written commun., 2000) also

Table 3. Summary of drainage area and state distribution of extreme peak discharge measurements

Contributing drainage area (square miles)	Number of extreme peak discharge measurements						
		Border states					
	Oklahoma	Arkansas	Kansas	Missouri	New Mexico	Texas	Total
0.1 to less than 1	22	4	1				27
1 to less than 10	115	2	2			1	120
10 to less than 100	120	9	4	2		2	137
100 to less than 1,000	154	9	9	3	1	13	189
1,000 to less than 10,000	119	3	5	1		11	139
10,000 to less than 50,000	33		2			11	46
50,000 or more	10	3					13
Total	573	30	23	6	1	38	671

report that contributing drainage area is the single most influential basin characteristic to use for determination of potential extreme peak-discharge curves. Therefore, other characteristics were not used in the development of the potential extreme peak-discharge curves for Oklahoma. The envelope curve of discharge data is referred to as potential extreme peak-discharge curve (Asquith and Slade, 1995).

Documented extreme peak discharges 25 kilometers into the bordering states were used to expand the data base of streamflow measurements and to account for data in the immediate bordering areas of a state with similar hydrology. The documented extreme peak discharges were plotted by state to check if the potential extreme peak-discharge curve analysis may be unduly influenced by bordering state data (fig. 3). Only one bordering state data point influenced the analysis, the largest documented extreme peak discharge near Van Buren, Arkansas, (site 214, table 1, back of report), the point at which the Arkansas River flows out of Oklahoma. This point is the upper limit in the east hydrologic region described in succeeding sections.

One possible discriminator for potential extreme peak-discharge curves for the state tested and rejected was dividing the data into the two major drainage basins, the Arkansas River basin and the Red River basin. The documented extreme peak discharges were plotted by major drainage basins (fig. 4) and it was decided by visual inspection that there was not enough difference of discharges between basins to warrant using this criterion. There does not appear to be a meaningful role for statistical testing of documented extreme peak discharges between envelope-curve hydrologic regions (W.F. Kirby, USGS, written commun., 2001); therefore, no statistical test was performed to verify this conclusion.

Another possible discriminator tested and accepted was dividing the data into two sets, east and west of a line roughly corresponding to the 28-inch mean annual precipitation line (Tortorelli, 1997), which divides the state into an east and west region. The documented extreme peak discharges were plotted by dividing the data into two hydrologic regions, east and west, separated by a longitude line, 98 degrees 15 minutes. It was decided by visual inspection that there was a significant difference of discharges between regions, and again no statistical test was performed to verify this conclusion. This was the criterion that was adopted to define two hydrologic regions. The resulting potential extreme peak-discharge curves are shown in figure 5 for the east region and figure 6 for the west region.

Peak-discharge data from all types of basins are presented in the graphs to see what type of peak-discharge measurement records define the potential extreme peak-discharge curves (figs. 5 and 6). The peak-discharge measurements presented are from unregulated basins and basins affected by regulation, urbanization, and irrigation. All extreme peak-discharge measurements, regardless of basin type, are documented in this publication to see if extreme peak-discharge measurements from other than unregulated basins would control, or define the potential extreme peak-discharge curves.

The relation between the estimated 100-year flood frequency discharge and the contributing drainage area for each of the streamflow-gaging stations was plotted

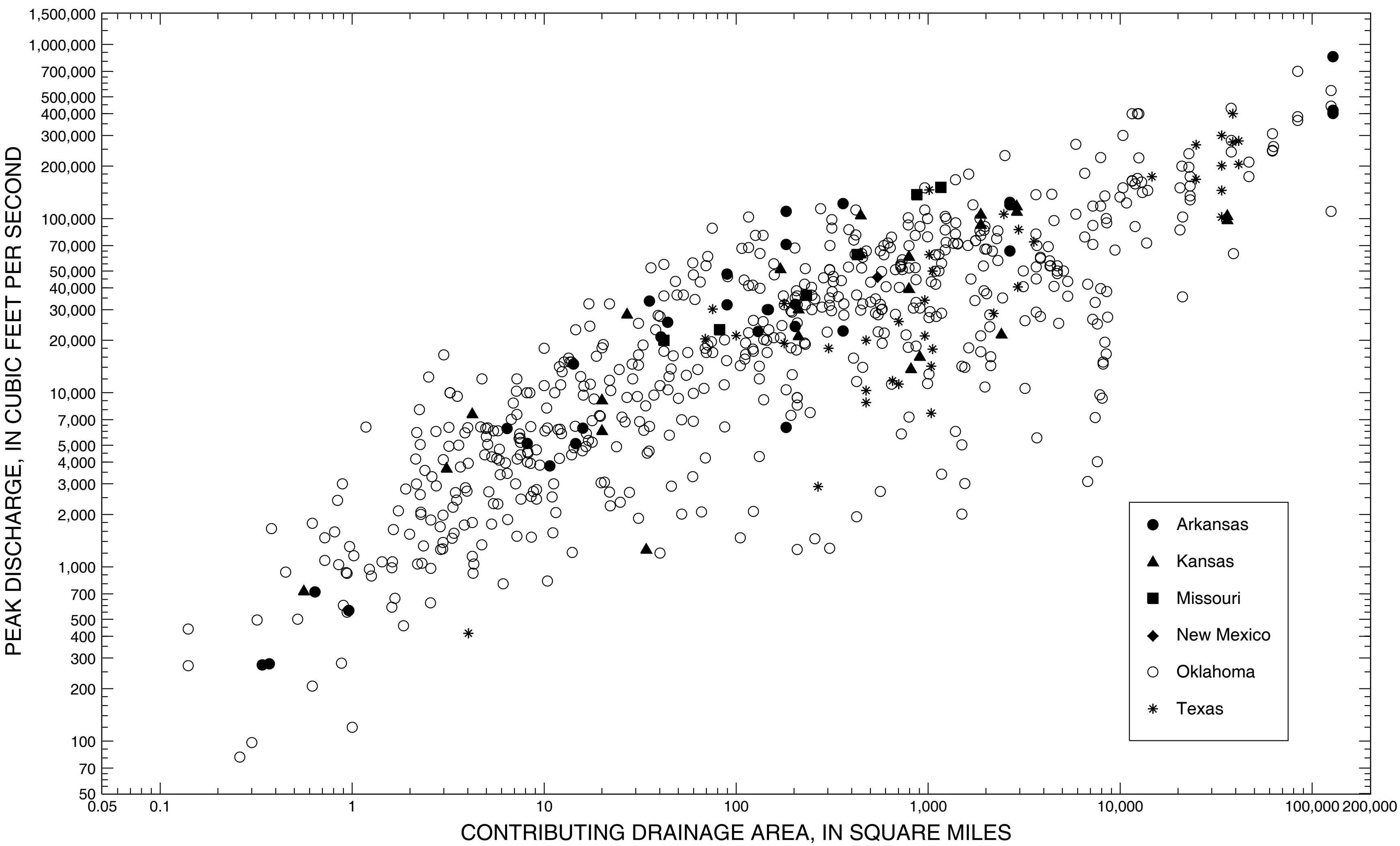

Figure 3. Distribution of extreme peak-discharge data by state.

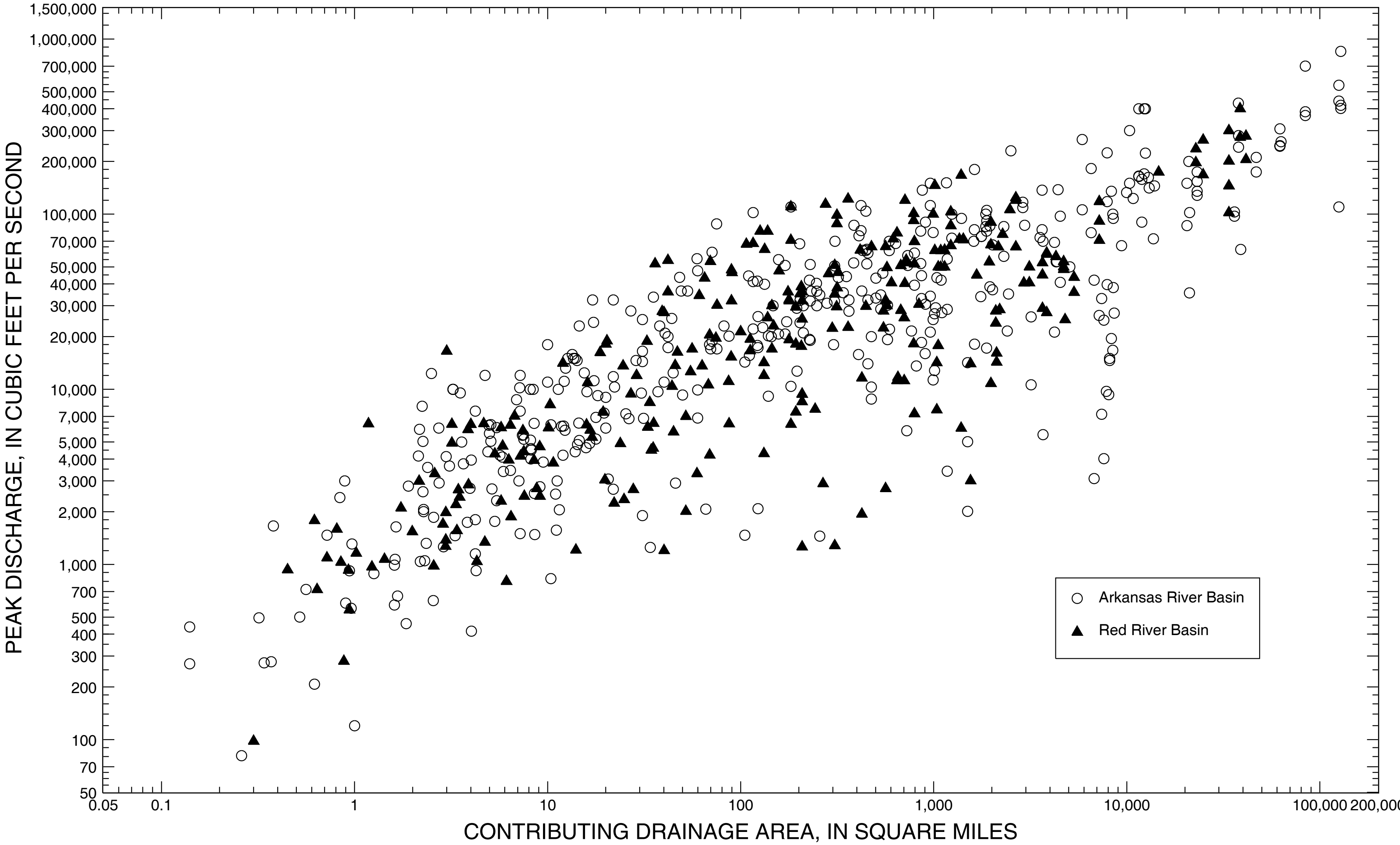

Figure 4. Distribution of extreme peak-discharge data by major drainage basins.

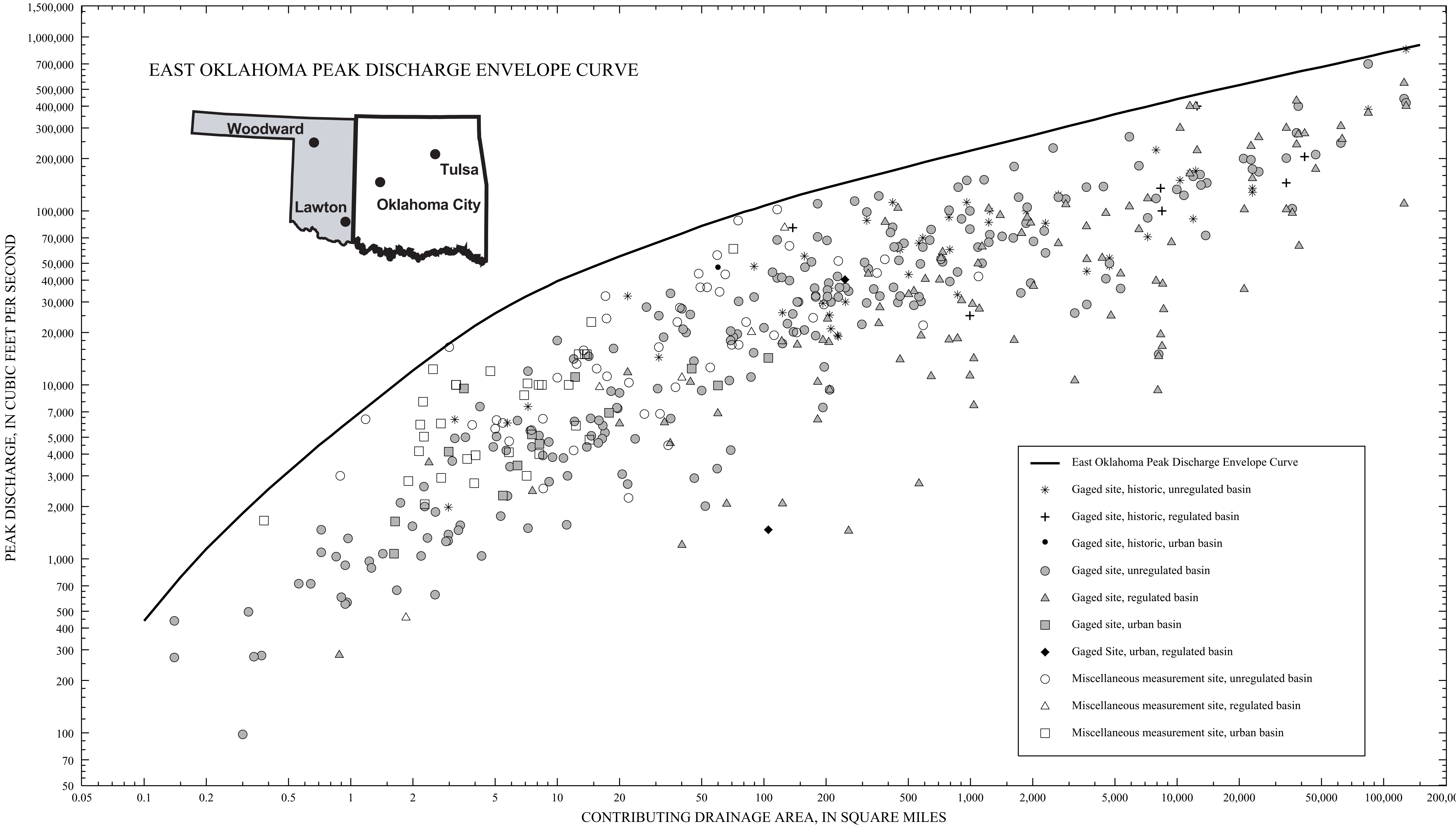

Figure 5. Oklahoma Peak Discharge Envelope Curve based on peak-discharge measurements at streamflow sites east of 98 degree 15 minutes longitude.

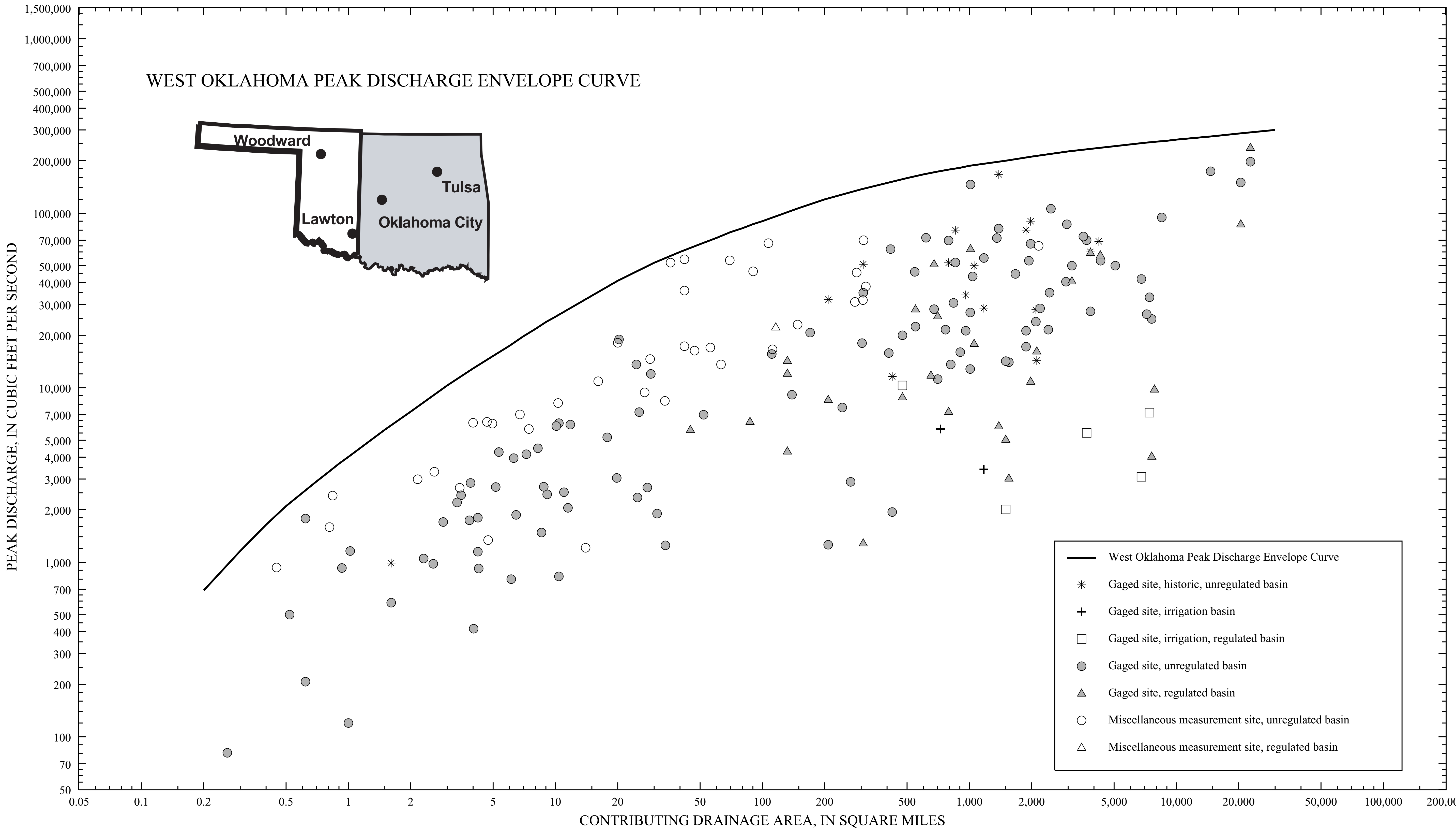

Figure 6. Oklahoma Peak Discharge Envelope Curve based on peak-discharge measurements at streamflow sites west of 98 degrees 15 minutes longitude.

and used to visually check each of the regional potential extreme peak-discharge curves as suggested by Asquith and Slade (1995). The 100-year peak discharges are listed in table 1 (back of report). These data resulted in the slight upward adjustment of both regional curves in the area below 1.0 square mile and above 1,000 square miles.

The potential extreme peak-discharge curves developed used all peak data as of 1999 water year and will be subject to change as greater peak discharges are subsequently documented. The upward trend of the curves through time is probably due to an increased number of streamflow-gaging stations and an increased period of record (Creager, 1939). However, the rate of increase in peak discharges experienced in the United States has been slowing due to a longer period of recorded data and, perhaps, to approaching geophysical limits (Wolman and Costa, 1984; Matthai, 1969). Longer periods of record also would tend to minimize the effect of weather fluctuations.

Generally, the extreme peak-discharge measurements did define the potential extreme peak-discharge curves in figures 5 and 6. Miscellaneous measurements of peak discharge in unregulated basins control the curve for drainage basin areas of about 200 square miles and less for the east region; a few miscellaneous measurements of peak discharge in urban basins control the curve for about 5 square miles and less. Miscellaneous measurements of peak discharge in unregulated basins control the curve for drainage basin areas of about 1,000 square miles and less for the west region. The potential extreme peak-discharge curve is defined mostly by measurements of peak discharge in unregulated basins at streamflow-gaging stations in the east region and a few measurements of peak discharge in regulated basins at streamflow-gaging stations and historical peaks, for drainage areas greater than 200 square miles (fig. 5). The potential extreme peak-discharge curve is defined by measurements of peak discharge in unregulated basins at streamflow-gaging stations and historical peaks in the west region for drainage areas greater than 1,000 square miles (fig. 6). One measurement from a regulated basin in the east region was used, Red River near Terral, Okla. (site 258, fig.1; table 1, back of report), in the west region curve. That measurement was used to provide a reasonable upper limit for the curve since most of the drainage area for the site is in the west region. A comparison of the potential extreme peak-discharge curves for two hydrologic regions (figs. 5 and 6) is shown in figure 7.

A potential extreme peak-discharge estimate for any site in a unregulated basin can be obtained from the potential extreme peak-discharge curve for the hydrologic region containing the site, if the contributing drainage area is known. Since all types of drainage basins were used to develop the curves, extreme peak-discharge estimates for sites in which there have been significant effects from manmade modification of streamflow may be obtained if caution is exercised to recognize the limitations of such estimates. For example, streams regulated by major dams are subject to reservoir operations. Urban basins with a high percentage of impervious land cover such as concrete, asphalt and buildings, when coupled with a highly localized storm, could conceivably have higher peak flow. Potential extreme peak-discharge estimates of all 514 sites are listed in tables 1 and 2 (back of report). The curves are presented in tabular form for convenience (table 4). Recurrence intervals cannot be associated with potential extreme peak-discharge estimates because the discharge data do not meet the criteria for statistical analysis (P.R. Jordan, USGS, written commun., 2001).

Summary

Knowledge of the magnitude and frequency of floods is required for the safe and economical design of highway bridges, culverts, dams, levees, and other structures on or near streams; and for flood plain management programs. The potential extreme peak discharge at a site, which is an estimate of the maximum expected peak discharge that could occur at a stream site, often is used in conjunction with flood frequency analysis to give the best evaluation of flood risk at a site. Potential extreme peak-discharge curves, derived from the relation between documented extreme peak-discharge measurements and the contributing drainage areas from a hydrologic region, are not associated with specific probabilities or frequencies, but give evidence as to the magnitude of flow that has occurred.

This report: (1) updates flood frequency estimates for gaged streamflow sites with 8 years or more of record for unregulated, regulated, and urban basins in and near Oklahoma, using data through 1999 water year; (2) presents documented extreme peak discharges for gaged and miscellaneous measurement sites; (3) presents potential extreme peak-discharge curves for unregulated basins for the State; and (4) presents potential extreme peak-discharge estimates for all the streamflow measurement sites used in this investigation.

Peak discharge and flood frequency for selected recurrence intervals from 2 to 500 years were determined for 352 gaged streamflow sites. Data through 1999 water year were used from streamflow-gaging stations with at least 8 years

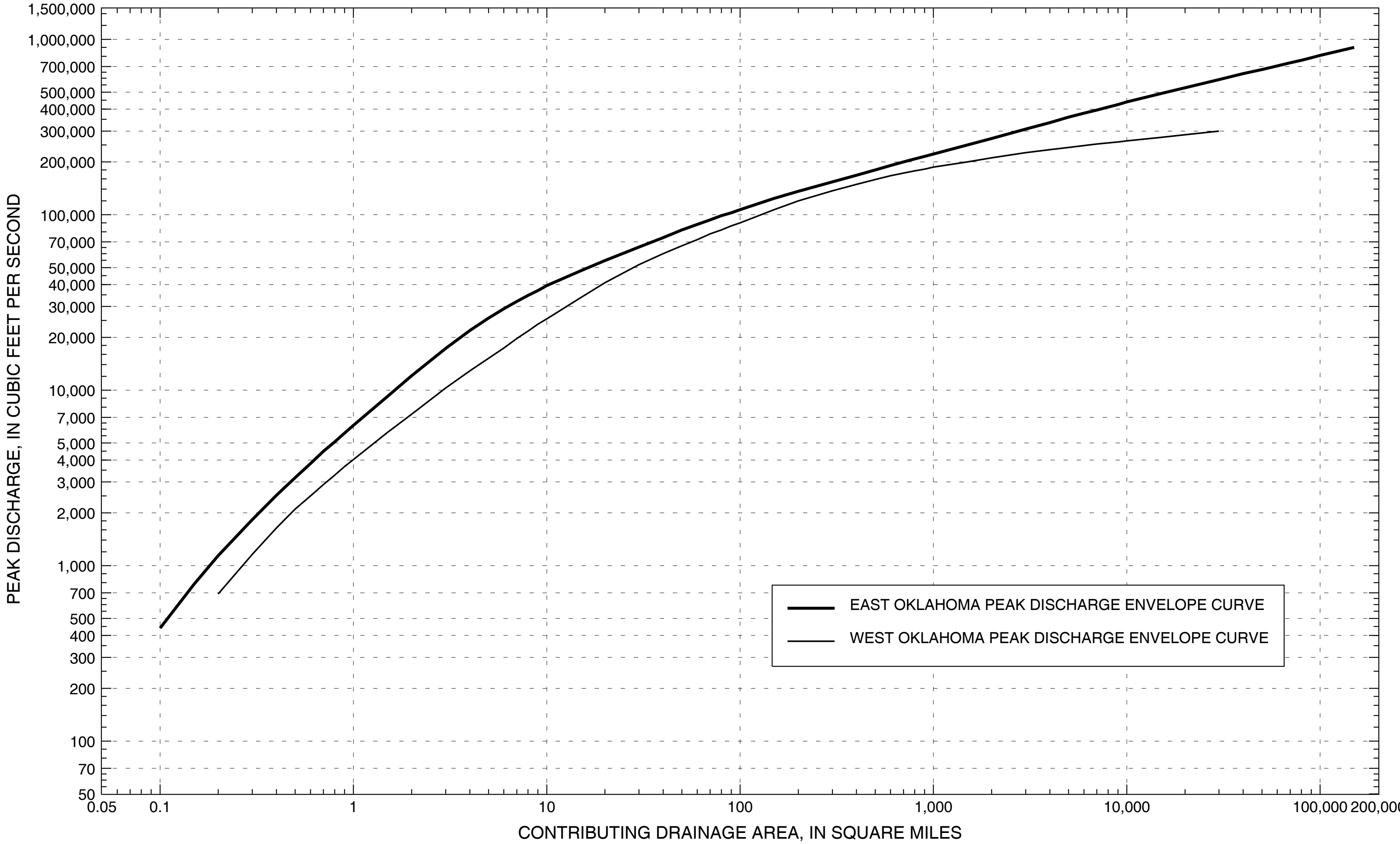

Figure 7. Comparison of East and West Oklahoma Peak Discharge Envelope Curves.

Table 4. Oklahoma Peak Discharge Envelope Curve Data

[mi^2, square miles; East, sites east of 98 degrees 15 minutes longitude; West, sites west of 98 degrees 15 minutes longitude]

Contributing drainage area (mi^2)	Peak discharge		Contributing drainage area (mi^2)	Peak discharge (cubic feet per second)	
	East	Wesxt		East	West
0.1	440		100	107,000	90,000
0.15	785		150	124,000	107,000
0.2	1,140	690	200	136,000	120,000
0.3	1,830	1,160	300	154,000	137,000
0.4	2,520	1,640	400	168,000	149,000
0.5	3,170	2,100	500	180,000	159,000
0.6	3,820	2,500	600	191,000	167,000
0.7	4,490	2,900	700	200,000	173,000
0.8	5,080	3,280	800	208,000	178,000
0.9	5,700	3,670	900	215,000	182,000
1	6,300	4,020	1,000	222,000	187,000
1.5	9,220	5,750	1,500	250,000	200,000
2	12,100	7,300	2,000	272,000	211,000
3	17,300	10,300	3,000	308,000	226,000
4	21,900	12,900	4,000	335,000	235,000
5	25,800	15,200	5,000	360,000	242,000
6	29,100	17,400	6,000	379,000	248,000
7	32,100	19,700	7,000	395,000	253,000
8	34,700	21,700	8,000	411,000	257,000
9	37,000	23,800	9,000	425,000	260,000
10	39,500	25,500	10,000	440,000	264,000
15	47,900	33,700	15,000	491,000	276,000
20	54,800	41,000	20,000	529,000	286,000
30	65,400	52,000	30,000	590,000	300,000
40	74,100	60,000	40,000	637,000	
50	82,000	66,500	50,000	672,000	
60	88,000	72,100	60,000	705,000	
70	93,500	77,800	70,000	735,000	
80	98,800	82,000	80,000	760,000	
90	102,500	86,500	90,000	785,000	
			100,000	810,000	
			150,000	900,000	

of record within Oklahoma or about 25 kilometers into the bordering states of Arkansas, Kansas, Missouri, New Mexico, and Texas. These sites were in unregulated basins, and basins affected by regulation, urbanization, and irrigation.

Two types of documented extreme peak discharges are presented. These are maximum peak discharges documented at 352 sites with streamflow-gaging stations within and near Oklahoma and selected large peak discharges documented at 162 selected sites in Oklahoma at miscellaneous measurement sites without streamflow-gaging stations or streamflow-gaging stations with short record, with a total of 671 measurements. The sites are fairly well distributed statewide, however many streams, large and small, have never been monitored.

Potential extreme peak-discharge curves were developed for streamflow sites in hydrologic regions of the state based on documented extreme peak discharges and the contributing drainage areas. Two hydrologic regions, east and west, were defined, using 98 degrees 15 minutes longitude as the dividing line. The relation between the estimated 100-year flood frequency peak discharge and the contributing drainage area for each of the streamflow-gaging stations also was used to check and adjust each of the regional potential extreme peak-discharge curves.

A potential extreme peak-discharge estimate for any site in a unregulated basin can be obtained from the potential extreme peak-discharge curve for the hydrologic region containing the site, if the contributing drainage area is known. However, since all types of drainage basins were used to develop the curves, extreme peak-discharge estimates for sites in which there have been significant effects from manmade modification of streamflow may be obtained if caution is exercised to recognize the limitations of such estimates.

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Supplemental Information

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

artial record site; H, historic, I, irrigation; N, unregulated; R, regulated; U, urban; ft^3/s, cubic feet per second; ed; Ave, Avenue; Lk, Lake; OKC, Oklahoma City; R., River; WY, water year]

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
sas City, Kans.	CONT	N	06/10/23	103,000	619,000
		R	11/03/98	97,400	
l, Kans.	CONT	N	04/23/44	105,000 [a,b]	267,000
		R	11/02/98	91,600	
er, Kans.	CSG	N	07/03/76	51,000	129,000
ca City, Okla.	CONT	R	05/14/93	62,900 [c]	632,000
r near Winchester, Okla.	CONT	HN	05/00/57	80,000	180,000
		N	08/19/61	52,200	
r near Alva, Okla.	CONT	N	10/23/41	27,000 [a]	187,000
		N	10/10/85	12,800	
ear Kiowa, Kans.	CONT	N	10/22/41	16,000 [a]	182,000
r near Cherokee, Okla.	CONT	N	10/23/41	35,000 [a]	218,000
r near Jet, Okla.	CONT	N	05/19/38	25,900	313,000
		R	04/02/73	10,600	
ar Kremlin, Okla.	CSG	N	10/11/73	12,000 [d]	32,600
r Tributary near Eddy, Okla.	CSG	N	09/06/69	1,320	13,900
ver at Tonkawa, Okla.	CONT	N	05/20/38	40,800 [a]	348,000
		R	10/11/73	97,300 [d]	
rbin, Kans.	CONT	HN	06/09/23	60,000 [a]	208,000
		N	10/11/85	39,300	
ackwell, Okla.	CONT	HN	06/10/23	100,000 [a]	266,000
		N	06/22/42	85,000	
Okla.	CSG	N	06/24/69	9,200	52,300
, Okla.	CSG	N	05/18/65	2,780	37,300
on, Okla.	CONT	N	10/13/73	211,000 [d]	661,000
		R	10/04/86	174,000	
ary near Garber, Okla.	CSG	N	08/14/74	1,310	6,120
Morrison, Okla.	CONT	N	04/18/57	496	1,970
Morrison, Okla.	CONT	N	07/15/51	440	716
ynee, Okla.	CONT	N	10/03/59	30,200	188,000
		R	10/05/86	19,200	
d Dam, Okla.	CONT	HN	09/04/40	32,400	56,800
		R	10/02/59	11,800	
r Guy, N. Mex.	CONT	N	08/21/65	46,100 [b]	163,000
nton, Okla.	CSG	N	07/06/58	15,600	93,700
nton, Okla.	CONT	N	10/17/65	43,400	188,000
enton, Okla.	CSG	N	08/06/71	7,250	46,900
Ck near Boise City, Okla.	CONT	HN	04/20/42	80,000 [a]	208,000
		N	05/15/51	17,200 [e]	
Wheeless, Okla.	CSG	N	08/21/65	2,520	27,100
hart, Kans.	CONT	N	05/26/77	21,500	217,000
gan, Okla.	CONT	HN	00/00/42	69,000	237,000
		N	10/20/65	21,200	
cane, Okla.	CONT	N	05/17/51	53,400 [e]	237,000

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

mi^2, square mile; E, sites east of 98 degrees 15 minutes longitude; W, sites west of 98 degrees 15 minutes longitu

Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)	Type basin (N/I/R/ U)	LPIII fl Peak discharge for: 2 yr	5 yr	10 yr
1	36,106	0370323	0970332	E	N	14,900	31,000	44,60
					R	22,900	44,100	61,20
2	1,880	0371327	0965940	E	N	18,100	34,000	46,70
					R	19,100	38,100	54,30
3	170	0371338	0964244	E	N	8,370	16,700	23,90
4	38,923	0364136	0965548	E	R	18,200	29,000	37,20
5	856	0365742	0984655	W	N	6,690	16,100	25,10
6	1,009	0364854	0983852	W	N	7,200	15,100	21,60
7	903	0370217	0982804	W	N	3,120	5,620	7,72
8	2,439	0364906	0981908	W	N	13,600	23,700	31,50
9	3,194	0364509	0980743	E	R	3,320	6,070	8,05
10	7.21	0363300	0974838	E	N	384	731	1,05
11	2.35	0364142	0972530	E	N	254	524	77
12	4,520	0364019	0971833	E	R	13,000	25,700	36,60
13	794	0370744	0973604	E	N	9,100	18,600	26,80
14	1,859	0364841	0971637	E	N	18,700	38,000	55,20
15	18.2	0365208	0963650	E	N	2,180	4,640	6,86
16	9.13	0364450	0963730	E	N	1,630	2,090	2,38
17	46,850	0363015	0964341	E	N	56,900	110,000	152,00
					R	47,600	87,200	117,00
18	0.97	0362325	0973720	E	N	90	290	54
19	0.32	0362107	0970402	E	N	132	228	30
20	0.14	0362050	0970402	E	N	65	157	24
21	576	0362037	0964757	E	N	6,710	11,700	16,00
					R	5,390	9,310	12,30
22	21.9	0361700	0963435	E	R	1,480	3,800	5,84
23	545	0365915	1032525	W	N	2,860	6,760	10,80
24	111	0365255	1030105	W	N	1,720	4,440	7,17
25	1,038	0365536	1025731	W	N	4,900	11,200	17,20
26	25.4	0365352	1025404	W	N	1,400	4,050	6,78
27	1,879	0365446	1023708	W	N	8,600	16,000	21,80
28	11.0	0364620	1024816	W	N	89	419	93
29	2,406	0370730	1015350	W	N	1,290	4,110	7,28
30	4,220	0370040	1002929	W	N	861	3,130	6,16
31	4,305	0365833	1001850	W	N	5,210	11,800	18,60

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
lewood, Kans.	CONT	N	05/20/55	13,600 [a]	179,000
nowles, Okla.	CSG	N	08/14/67	1,150	13,400
nd, Kans.	CSG	N	07/21/61	1,250	55,200
ffalo, Okla.	CONT	N	09/26/73	26,400	254,000
dale, Okla.	CONT	N	08/09/67	15,800	150,000
ynoka, Okla.	CONT	N	05/16/57	94,500 [a]	259,000
y near Lone Wolf, Okla.	CSG	N	11/02/74	921	13,500
ar Waynoka, Okla.	CSG	HN	07/04/51	990	6,090
		N	08/21/70	587	
y near Isabella, Okla.	CSG	N	05/07/69	207	2,580
r Okeene, Okla.	CSG	N	09/20/74	4,500	22,200
Okla.	CONT	N	09/19/74	12,700	135,000
ver, Okla.	CSG	N	05/15/57	6,420 [a]	47,100
near Goltry, Okla.	CSG	N	05/26/76	5,050	26,100
amond, Okla. [1]	CSG	HN	00/00/32	30,000	145,000
		N	10/11/73	36,300 [d]	
ver, Okla.	CONT	N	10/03/86	123,000	448,000
ingfisher, Okla. [1]	CSG	HN	06/23/48	55,000 [a]	126,000
		N	05/27/77	20,700	
Seward, Okla.	CONT	R	06/09/95	43,500	157,000
uthrie, Okla.	CONT	N	00/00/49	271	716
thrie, Okla.	CONT	HN	05/00/35	90,000	460,000
		N	05/17/57	158,000 [a]	
ell, Okla.	CONT	N	05/16/57	75,200 [a,b]	169,000
Orlando, Okla.	CSG	N	05/07/82	4,400	46,100
ns, Okla.	CONT	N	10/04/86	162,000	470,000
ley, Okla. [2]	CONT	N	05/10/93	141,000 [c]	471,000
water, Okla.	CONT	HN	04/27/12	14,400	66,300
		N	10/02/59	25,000 [b]	
Okla.	CSG	N	09/21/65	1,260	16,700
, Okla.	CONT	N	06/21/35	72,300	478,000
ford, Okla.	CONT	N	05/18/57	145,000	478,000
Okla.	CONT	HN	06/13/23	244,000	711,000
		N	10/05/59	246,000	
		R	10/05/86	307,000	
at Tulsa, Okla.	CONT	U	06/09/95	11,100	43,200
yburn Reservoir	CONT	HN	09/04/40	26,000 [a]	115,000
		N	05/19/49	17,300	
		R	11/04/74	2,080	
Okla. [1]	CSG	N	06/09/74	9,280	82,000
outh at Tulsa, Okla.	CONT	U	10/05/98	6,910	51,800
t St South at Tulsa, Okla.	CONT	U	10/05/98	2,310	27,300
kell, Okla.	CONT	R	10/05/86	259,000	714,000
endence, Kans.	CONT	N	04/17/45	117,000 [a]	304,000

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/I/R/ U)	LPIII flo Peak discharge for: 2 yr	5 yr	10 yr
32	813	0370154	1001229	W	N	902	3,440	6,520
33	4.22	0365230	1000720	W	N	106	271	435
34	34.0	0371136	0995448	W	N	391	686	905
35	7,191	0365107	0991854	W	N	3,410	8,480	13,100
36	408	0364614	0992200	W	N	1,050	4,110	7,980
37	8,504	0363102	0985245	W	N	14,400	32,400	46,800
38	4.26	0362425	0984410	W	N	534	771	929
39	1.61	0363540	0984400	W	N	146	360	570
40	0.62	0361630	0982100	W	N	83	143	190
41	8.23	0360300	0981900	W	N	660	1,960	3,500
42	196	0360611	0981136	E	N	4,590	7,130	9,060
43	14.5	0360230	0980048	E	N	200	521	897
44	5.08	0362840	0980805	E	N	342	999	1,760
45	248	0361905	0980003	E	N	2,630	7,200	12,200
46	10,787	0355706	0975451	E	N	26,700	51,200	71,700
47	157	0355003	0980357	E	N	3,070	9,820	18,300
48	320	0354849	0972840	E	R	8,220	19,800	30,400
49	0.14	0354847	0972414	E	N	30	80	137
50	11,966	0355514	0972532	E	N	30,200	58,000	78,600
51	410	0360336	0973505	E	N	5,320	14,200	24,400
52	13.9	0360845	0972805	E	N	972	2,190	3,380
53	12,926	0355727	0970154	E	N	31,200	61,800	86,200
54	13,053	0355909	0965443	E	N	33,200	65,500	90,800
55	31.0	0360658	0965203	E	N	2,150	4,660	7,190
56	2.89	0360750	0964950	E	N	582	908	1,160
57	13,743	0360538	0963452	E	N	37,500	50,400	58,600
58	13,923	0360932	0962354	E	N	33,100	61,000	82,300
59	62,074	0360826	0960022	E	N	80,000	140,000	183,000
					R	42,900	82,800	117,000
60	12.2	0360432	0955737	E	U	5,750	8,020	9,570
61	123	0355642	0961739	E	N	8,820	16,900	24,400
					R	1,390	1,890	2,160
62	50.0	0354908	0955318	E	N	3,280	5,800	7,930
63	17.8	0360101	0955055	E	U	3,050	4,990	6,420
64	5.45	0360103	0955138	E	U	1,080	1,560	1,910
65	62,932	0354915	0953819	E	R	52,400	93,600	129,000
66	2,892	0371326	0954043	E	N	28,100	49,300	66,100

peak discharges and flood frequency estimated for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge			Potential extreme peak discharge (ft^3/s) (table 4)
		Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	
		R	10/04/86	109,000	
City, Kans.	CSG	N	07/03/76	7,500	22,800
apah, Okla.	CONT	N	05/20/43	137,000 [a]	325,000
		R	10/05/86	81,500	
ear Hollow, Okla.	CSG	N	03/08/74	1,040	13,100
ogah, Okla.	CONT	R	10/14/86	53,700	343,000
ar Vale, Kans.	CSG	N	10/02/86	3,650	17,800
ear Hooser, Kans.	CSG	N	10/03/86	720	3,560
ta, Kans.	CSG	N	09/13/61	9,000	54,800
		R	06/22/77	6,000	
Kans.	CONT	N	09/13/61	62,000 [b]	173,000
		R	10/03/86	104,000	
Okla.	CONT	N	04/10/44	51,000 [a]	203,000
		R	10/03/86	58,000	
Copan, Okla.	CONT	N	04/10/44	36,400 [a]	171,000
Cotton Ck, near Copan, Okla. [3]	CONT	HN	04/00/44	43,100	180,000
		R	03/10/74	33,200	
Creek at Bartlesville, Okla.	CONT	R	10/04/86	94,500	244,000
ska, Okla.	CSG	N	07/14/65	660	10,200
kla.	CONT	N	05/09/93	20,200 [c]	120,000
ata, Okla.	CONT	N	06/13/57	33,800	261,000
tary near Bartlesville, Okla.	CSG	N	06/24/69	919	5,940
ar Ramona, Okla.	CONT	R	06/23/57	3,580 [b]	14,100
na, Okla.	CONT	N	10/03/45	38,500 [a]	270,000
		R	10/05/86	85,600	
remore, Okla.	CONT	N	05/21/43	182,000 [a]	388,000
		R	10/12/86	78,400	
ake near Barnsdall, Okla.	CONT	R	10/07/86	2,070	91,300
la.	CONT	N	10/02/59	32,400	163,000
		R	06/10/85	27,900	
o, Okla.	CONT	N	03/10/74	9,520	65,900
took, Okla.	CONT	N	10/03/59	35,600	160,000
Okla.	CONT	N	10/03/59	90,000	215,000
		R	05/10/93	30,600 [c]	
nnati Ave at Tulsa, Okla.	CONT	U	05/04/99	4,580	35,200
a.	CONT	U	06/23/95	5,190	33,500
, Okla.	CONT	R	05/11/93	29,200	223,000
eet North at Tulsa, Okla.	CONT	HU	05/27/84	47,500 [f]	88,000
		U	08/20/89	9,920	
way 266 near Catoosa, Okla.	CONT	R	05/11/93	27,400 [c]	228,000
a, Okla.	CONT	HN	05/21/43	224,000 [a]	410,000
		N	05/12/61	118,000	
		R	05/01/70	39,600	
kla.	CSG	N	06/03/73	1,570	41,300
ego, Kans.	CSG	HN	05/00/35	21,000	138,000

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/I/R/ U)	LPIII fl Peak discharge fo		
						2 yr	5 yr	10 yr
66					R	22,000	34,900	45,200
67	4.22	0371138	0952652	E	N	1,270	2,180	2,880
68	3,639	0365104	0953509	E	N	33,800	58,000	77,800
					R	32,400	47,500	58,100
69	2.19	0365250	0951600	E	N	423	613	748
70	4,339	0362514	0954103	E	R	20,500	27,900	32,600
71	3.10	0370648	0962729	E	N	840	2,160	3,310
72	0.56	0370627	0963427	E	N	148	334	488
73	20.0	0370634	0962355	E	R	2,570	3,980	4,960
74	445	0370013	0961854	E	N	13,900	28,400	38,800
					R	16,100	29,000	38,500
75	733	0365537	0960506	E	N	14,900	25,600	32,900
					R	3,540	6,830	10,200
76	424	0365815	0955605	E	N	10,900	20,100	26,800
77	502	0365342	0955809	E	N	12,700	20,400	25,800
					R	6,740	12,500	18,100
78	1,392	0364520	0955819	E	R	8,720	20,200	32,700
79	1.67	0364530	0961230	E	N	320	607	822
80	139	0364310	0960756	E	N	8,260	13,300	16,600
81	1,753	0363826	0955602	E	R	14,100	22,500	27,700
82	0.94	0364340	0955052	E	N	353	517	618
83	2.39	0363050	0955625	E	R	1,020	2,500	3,580
84	1,955	0363032	0955030	E	R	19,100	34,200	48,000
85	6,534	0361825	0954152	E	N	43,900	73,900	96,400
					R	24,300	34,500	41,000
86	66.0	0363200	0960943	E	R	846	1,460	1,850
87	364	0362912	0960350	E	N	12,500	19,300	23,900
					R	16,400	23,000	27,200
88	30.6	0363206	0960254	E	N	5,190	7,910	9,700
89	340	0362055	0960635	E	N	8,300	12,800	16,500
90	905	0361642	0955714	E	N	14,200	25,600	35,900
					R	16,900	24,000	28,800
91	8.20	0361255	0955942	E	U	1,910	3,050	3,870
92	7.53	0361140	0955450	E	U	1,970	3,320	4,500
93	1,022	0361455	0955206	E	R	16,300	21,700	25,200
94	59.9	0361314	0955130	E	U	5,770	8,370	11,400
95	1,103	0361323	0954909	E	R	17,400	22,000	24,600
96	7,911	0360951	0953711	E	N	50,800	89,300	120,000
97	11.1	0360850	0952705	E	N	901	1,410	1,780
98	211	0371130	0951130	E	N	8,310	12,900	16,100

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least 8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge			Potential extreme peak discharge (ft^3/s) (table 4)
		Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	
		N	06/22/48	30,000 [a]	
Kans.	CSG	N	07/03/76	28,000	62,200
merce, Okla.	CONT	N	07/15/51	267,000 [a,b]	377,000
		R	04/13/94	106,000	
Bridge, Miami, Okla.	CONT	U	09/25/93	12,400 [c]	77,700
Mo. [4]	CONT	N	09/26/93	151,000	231,000
rsville, Mo.	CONT	N	07/03/76	36,300	142,000
n, Mo.	CONT	N	05/18/43	62,100 [a]	171,000
w, Okla.	CONT	N	09/26/93	230,000 [c]	290,000
, Okla.	CSG	N	06/13/64	4,400	25,400
o. [5]	CSG	N	10/02/59	20,000	75,700
ear Gravette, Ark.	CSG	N	05/19/61	562	6,060
Mo.	CONT	N	04/19/41	137,000 [a,b]	213,000
Okla.	CSG	HN	05/00/43	7,500	32,600
		N	02/01/68	1,500	
e, Okla.	CONT	N	04/15/27	133,000 [a]	440,000
kla.	CSG	N	07/03/76	2,690	56,800
ley, Okla.	CONT	HN	06/00/35	150,000	443,000
		R	05/20/43	300,000	
ramid Corners, Okla. [6]	CSG	N	03/08/74	18,800	94,100
g Cabin, Okla.	CONT	HN	05/18/43	63,000 [a]	174,000
		N	10/03/59	52,000	
camore, Okla.	CONT	N	07/27/75	39,800	118,000
Okla.	CSG	N	11/24/73	4,640	49,000
teau, Okla.	CONT	HN	04/19/27	165,000	456,000
		R	05/20/43	400,000	
		R	06/11/95	164,000	
Okla.	CONT	HN	05/10/43	19,000	141,000
		N	10/03/59	32,000	
oner, Okla.	CONT	HN	04/16/27	170,000	464,000
		R	05/21/43	400,000 [a]	
t Gibson Lake	CONT	HR	05/21/43	400,000	465,000
.		R	05/26/57	223,000	
skogee, Okla.	CONT	HN	05/00/1898	384,000	770,000
		N	05/21/43	700,000	
		R	05/26/57	366,000	
l, Okla.	CSG	N	04/19/68	1,860	15,100
prings, Ark.	CONT	N	05/10/50	22,500 [a]	117,000
ear Tonitown, Ark.	CSG	N	07/23/59	278	2,310
rs, Ark.	CSG	N	11/19/85	5,100	47,200
, Okla.	CONT	N	07/25/60	68,000	194,000
n, Ark.	CONT	N	06/08/74	14,600	46,600
loam Springs, Okla.	CONT	R	06/30/99	6,860	87,900
Okla.	CONT	N	06/08/74	44,400	110,000

Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/I/R/ U)	LPIII fl Peak discharge fo		
						2 yr	5 yr	10 yr
99	27.0	0370615	0945621	E	N	4,170	11,000	18,000
100	5,876	0365543	0945726	E	N	34,200	59,800	82,200
					R	37,900	57,000	71,200
101	44.7	0365400	0945205	E	U	3,090	5,860	8,400
102	1,164	0371444	0943358	E	N	18,700	34,400	47,100
103	232	0370826	0942257	E	N	5,620	11,500	16,700
104	427	0370123	0943558	E	N	7,350	15,000	21,700
105	2,510	0365604	0944449	E	N	35,500	64,000	86,900
106	4.90	0365225	0944135	E	N	786	1,480	2,060
107	42.0	0365028	0943630	E	N	890	3,140	6,010
108	0.96	0362651	0942636	E	N	101	296	495
109	872	0363753	0943512	E	N	20,400	40,500	56,500
110	7.21	0363720	0944450	E	N	1,130	1,620	1,960
111	9,969	0363645	0944925	E	N	62,200	100,000	126,000
112	21.9	0364150	0945720	E	N	1,680	2,120	2,380
113	10,335	0362620	0950254	E	R	53,800	108,000	152,000
114	71.1	0364806	0950948	E	N	4,710	8,470	11,400
115	450	0363406	0950907	E	N	16,600	29,000	38,500
116	133	0362007	0943827	E	N	3,480	8,730	13,600
117	15.8	0362515	0944610	E	N	843	2,160	3,530
118	11,534	0361346	0951057	E	R	56,400	90,200	117,000
119	229	0361652	0951932	E	N	5,180	11,600	18,100
120	12,307	0355544	0951608	E	R	115,000	221,000	285,000
121	12,495	0355110	0951344	E	R	47,400	82,100	108,000
122	84,133	0354610	0951749	E	N	161,000	236,000	284,000
123	2.57	0354837	0950407	E	N	433	864	1,230
124	130	0361319	0941718	E	N	4,980	10,200	14,800
125	0.37	0361038	0941640	E	N	63	164	268
126	14.6	0355842	0942956	E	N	1,700	4,010	6,040
127	635	0360748	0943419	E	N	18,900	33,300	43,400
128	14.2	0361520	0942550	E	N	786	2,090	3,430
129	59.8	0361258	0943615	E	R	1,270	3,300	5,260
130	110	0361111	0944224	E	N	3,950	9,750	15,200

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft³/s)	Potential extreme peak discharge (ft³/s) (table 4)
equah, Okla.	CSG	N	06/08/74	5,000	20,000
quah, Okla.	CONT	HN	01/00/16	112,000	219,000
		N	05/10/50	150,000 [a,b]	
ls, Ark.	CONT	N	11/18/85	20,900	74,600
la.	CONT	N	05/03/90	50,600	155,000
Okla. [7]	CONT	N	05/11/50	180,000 [a]	256,000
		R	06/09/57	18,100	
, Okla.	CONT	HN	02/00/38	19,300	141,000
		N	05/10/43	42,000 [a]	
as, Okla.	CSG	N	05/23/81	6,270	26,200
ar Hydro, Okla.	CSG	N	09/21/65	1,050	8,230
eport, Okla.	CONT	N	06/23/48	150,000	287,000
		R	05/17/82	86,100	
e, Okla.	CSG	N	10/20/83	3,000	41,500
y near Newcastle, Okla.	CSG	N	04/14/65	1,460	18,800
ble, Okla.	CONT	R	09/22/65	35,500	536,000
ll, Okla.	CONT	R	05/29/87	102,000	536,000
chard, Okla.	CSG	N	11/20/63	887	7,820
ell, Okla.	CONT	N	10/20/83	67,700 [g]	136,000
ear Asher, Okla.	CSG	N	05/13/68	2,000	13,600
, Okla.	CSG	N	10/08/70	2,600	13,500
nderbird near Norman, Okla. [8]	CONT	N	05/25/57	34,600 [a]	146,000
		R	05/10/90	1,450	
eh, Okla.	CONT	HN	06/00/32	60,000 [a]	175,000
		N	05/25/57	32,400	
		R	05/03/90	14,000 [h]	
a, Okla.	CONT	HN	06/00/39	33,000	213,000
		N	05/11/50	44,600 [a]	
		R	05/01/85	18,500	
near Atwood, Okla.	CSG	N	10/08/70	1,470	4,610
, Okla.	CONT	HN	08/07/06	128,000	548,000
		HN	05/31/37	135,000	
		N	05/11/50	174,000	
		R	05/29/87	154,000	
on, Okla.	CSG	N	05/13/68	5,460	33,100
, Okla.	CSG	N	03/27/77	18,000	39,500
s, Okla.	CONT	HN	02/18/38	70,000 [a]	190,000
		N	05/11/43	62,000	
on, Okla. [9]	CONT	HN	06/00/37	28,600	192,000
		N	06/15/64	55,400	
		I	09/15/88	3,410	
lt, Okla.	CSG	N	08/19/65	1,900	52,800
uymon, Okla. [9]	CONT	I	06/20/82	5,800	174,000
ardesty, Okla. [9]	CONT	N	06/25/47	21,500	176,000
pearman, Tex.	CONT	HN	09/04/38	34,000 [a]	185,000
		N	10/07/46	21,200	

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

Site number (fig. 1)	Contrib-uting drainage area (mi²)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/I/R/ U)	LPIII Peak discharge f: 2 yr	5 yr	10 y
131	3.59	0355837	0945524	E	N	536	1,760	3,1
132	959	0355522	0945524	E	N	19,800	39,100	54,9
133	40.6	0355248	0942911	E	N	7,110	14,000	19,4
134	307	0355516	0945018	E	N	15,200	26,300	34,3
135	1,626	0353423	0950407	E	N	31,300	64,300	94,3
					R	8,180	11,900	14,3
136	227	0353318	0951828	E	N	9,170	23,700	39,2
137	10.4	0354808	0984715	W	N	794	2,170	3,6
138	2.31	0353210	0982850	W	N	304	539	7
139	20,475	0353237	0981903	W	N	26,200	45,300	60,0
					R	16,200	31,400	43,8
140	11.2	0351728	0974510	E	N	1,260	2,130	2,8
141	3.32	0351727	0973720	E	N	710	1,180	1,5
142	21,110	0350455	0972252	E	R	15,700	24,100	30,8
143	21,138	0350050	0972050	E	R	21,400	43,200	62,7
144	1.26	0350720	0974210	E	N	378	666	9
145	202	0345956	0972200	E	N	8,750	16,900	24,5
146	2.28	0345909	0965848	E	N	400	746	1,0
147	2.26	0345410	0962320	E	N	660	1,210	1,6
148	257	0351318	0971249	E	N	5,300	8,500	11,2
					R	667	960	1,1
149	456	0351021	0965554	E	N	9,200	16,800	24,0
					R	5,040	7,230	8,8
150	865	0345902	0963301	E	N	15,200	26,900	36,7
					R	7,820	11,900	14,6
151	0.72	0345710	0962040	E	N	300	590	8
152	23,151	0345840	0961436	E	N	60,400	94,700	121,0
					R	53,300	88,900	114,0
153	7.40	0351110	0960420	E	N	1,650	3,030	4,2
154	9.99	0344740	0952050	E	N	4,150	7,940	11,2
155	588	0345900	0953700	E	N	11,600	20,500	28,3
156	1,175	0364317	1012921	W	N	8,580	21,400	33,1
					I	181	1,160	2,5
157	31.0	0363323	1024710	W	N	131	706	1,6
158	725	0363419	1012252	W	I	223	979	1,9
159	767	0363838	1011238	W	N	2,720	7,460	12,3
160	960	0361208	1011820	W	N	2,400	6,510	11,2

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge			Potential extreme peak discharge (ft^3/s) (table 4)
		Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	
ear Turpin, Okla.	CSG	N	03/23/73	120	4,020
Okla. [9]	CONT	N	10/08/46	70,000 [a]	232,000
		IR	06/10/83	5,510	
near Balko, Okla.	CSG	N	08/22/65	1,800	13,400
od, Okla.	CONT	N	05/17/89	20,700	112,000
butary near Doarrouzett, Tex.	CONT	N	08/31/66	416	13,000
ar Catesby, Okla.	CSG	N	06/09/68	1,480	22,900
upply, Okla.	CONT	N	10/09/46	50,000 [a]	242,000
, Tex. [9]	CONT	N	10/21/41	20,000 [a]	156,000
		R	05/31/63	8,790	
		IR	09/19/96	10,300	
reek near Gage, Okla.	CSG	N	05/13/69	5,200	37,800
Okla. [9]	CONT	N	06/23/57	81,600 [a]	197,000
pply, Okla. [9]	CONT	N	06/24/39	14,200	200,000
		R	05/19/57	5,020	
		IR	05/13/79	2,010	
Woodward, Okla. [9]	CONT	N	10/10/46	42,000	252,000
		IR	05/23/89	3,090	
Vici, Okla.	CSG	N	05/13/75	2,050	28,000
Okla. [1]	CSG	N	08/27/74	9,120	103,000
ar Seiling, Okla. [9]	CONT	N	05/19/51	33,000	255,000
		IR	09/23/97	7,200	
Canton, Okla.	CONT	N	10/12/46	24,800 [a]	255,000
		R	06/11/49	4,020	
ibutary near Eagle City, Okla.	CSG	N	06/11/67	501	2,180
Weavers Ck near Watonga, Okla.	CONT	R	10/03/86	9,740	256,000
ar Calumet, Okla.	CONT	R	05/10/93	9,310	412,000
ar El Reno, Okla.	CONT	N	10/28/41	15,000 [a]	413,000
		R	05/10/93	14,600 [c]	
low Lake Overholser	CONT	HR	10/00/23	135,000	416,000
la.		R	06/11/95	19,500	
ar Oklahoma City, Okla. [10]	CONT	HR	06/03/32	100,000	417,000
		R	10/30/41	16,700	
Britton Rd at OKC, Okla.	CONT	R	05/09/93	38,100 [c]	418,000
ar Harrah, Okla.	CONT	R	05/29/87	27,200	419,000
ell, Okla.	CSG	N	04/30/85	3,840	38,200
ar Wetumka, Okla.	CONT	R	04/15/45	66,000 [a]	431,000
leetka, Okla.	CSG	N	10/01/86	4,910	50,000
' near Dustin, Okla.	CSG	N	05/13/68	622	15,000
Okla.	CONT	U	11/02/74	14,300	109,000
		UR	06/28/89	1,470	
, Okla.	CONT	N	10/21/83	28,700	183,000
		R	06/09/95	34,600	
ler, Okla.	CONT	N	05/23/52	2,910 [a]	78,800

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydro-logic region (E/ W)	Type basin (N/ I/R/ U)	LPIII fl Peak discharge fo		
						2 yr	5 yr	10 y
161	1.00	0365150	1005445	W	N	34	71	101
162	3,685	0364920	1003108	W	N	9,100	18,500	27,300
					IR	838	2,310	3,600
163	4.22	0363701	1003950	W	N	59	306	691
164	170	0363852	1003007	W	N	1,290	4,710	9,040
165	4.03	0362400	1001630	W	N	78	210	346
166	8.57	0362930	0995720	W	N	113	462	920
167	5,068	0363530	0993530	W	N	9,640	19,400	27,800
168	475	0361416	1001630	W	R	3,240	7,040	10,100
					IR	259	1,530	3,830
169	17.8	0361426	0994630	W	N	495	1,400	2,380
170	1,386	0362357	0993722	W	N	4,300	9,040	13,500
171	1,498	0363400	0993305	W	R	924	2,170	3,170
					IR	306	735	1,160
172	6,777	0362612	0991641	W	N	5,330	12,400	19,400
					IR	759	1,460	1,980
173	11.5	0360845	0991200	W	N	436	1,010	1,540
174	139	0361126	0990036	W	N	2,280	4,370	6,080
175	7,414	0361100	0985515	W	N	4,250	8,800	13,200
					IR	2,010	3,720	5,050
176	7,601	0360437	0983547	W	N	8,000	13,800	18,500
					R	1,100	1,610	2,080
177	0.52	0355530	0983500	W	N	89	228	378
178	7,837	0354843	0982514	W	R	2,300	4,040	5,270
179	8,063	0353701	0980354	E	R	3,060	5,270	7,090
180	8,143	0353347	0975726	E	N	4,780	7,180	9,000
					R	3,220	5,760	7,790
181	8,323	0352843	0973947	E	R	3,490	9,110	14,500
182	8,455	0352940	0972540	E	R	4,860	8,190	11,800
183	8,514	0353356	0972201	E	R	12,700	24,200	33,200
184	8,602	0353001	0971137	E	R	6,450	11,700	16,200
185	9.48	0352056	0962940	E	N	1,400	2,160	2,760
186	9,391	0351556	0961221	E	R	11,900	19,800	26,100
187	16.5	0352144	0960855	E	N	2,180	3,350	4,220
188	2.56	0351716	0960305	E	N	363	523	637
189	105	0353850	0972135	E	N	6,380	11,200	14,200
190	532	0354051	0970029	E	R	11,700	19,300	25,300
191	46.0	0354208	0965320	E	N	2,030	2,560	2,910

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least 8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 1)	Contrib-uting drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII fl Peak discharge fo: 2 yr	5 yr	10 yr
k, Okla.	CONT	N	11/02/74	18,000	93,000	192	69.0	0354655	0965114	E	N	3,870	6,940	9,640
Okla.	CONT	N	05/11/43	66,800 [a]	273,000	193	2,018	0354026	0960406	E	N	9,440	22,600	36,900
		R	03/16/90	37,000							R	10,300	19,500	27,200
s, Okla.	CSG	N	06/08/74	3,390	28,800	194	5.90	0354453	0960207	E	N	1,090	2,100	2,980
Okla.	CONT	HN	10/00/08	85,000	283,000	195	2,307	0352843	0955257	E	N	11,100	23,600	35,600
		N	04/16/45	57,400										
erprise, Okla.	CSG	N	05/13/68	4,200	28,000	196	5.66	0351450	0952250	E	N	1,840	3,390	4,690
itefield, Okla.	CONT	N	05/10/43	281,000	627,000	197	37,876	0351550	0951421	E	N	100,000	175,000	233,000
		R	05/03/90	241,000 [h]							R	30,300	51,400	70,800
kla.	CSG	N	04/20/66	7,320	54,200	198	19.6	0353214	0945815	E	N	2,840	4,240	5,270
isaw, Okla.	CONT	N	04/15/45	110,000 [a,b]	132,000	199	182	0352752	0945143	E	N	12,700	28,500	43,900
		R	10/26/70	10,400							R	6,110	8,290	9,540
ngton, Okla.	CSG	N	04/05/64	3,070	55,400	200	20.6	0351710	0944535	E	N	1,600	2,120	2,470
Okla.	CSG	N	05/13/68	602	5,700	201	0.90	0351440	0944435	E	N	265	407	511
ar Long, Okla.	CSG	N	10/26/70	1,760	26,900	202	5.32	0353115	0943710	E	N	865	1,410	1,810
n, Ark.	CONT	N	05/20/60	32,200	137,000	203	203	0345508	0941755	E	N	11,000	19,800	26,900
		R	05/03/90	24,000							R	9,480	13,100	15,500
d Oak, Okla.	CONT	N	05/19/60	41,500	114,000	204	122	0345445	0950920	E	N	6,560	14,100	21,200
		R	11/24/73	17,800							R	3,610	6,090	8,060
r, Okla.	CONT	N	05/16/45	78,600 [a]	222,000	205	993	0345615	0944254	E	N	25,900	51,200	73,000
		R	05/27/57	11,300							R	6,560	7,740	8,500
		HR	05/00/90	25,000 [i]										
Okla.	CONT	HN	06/18/35	100,000	235,000	206	1,240	0350335	0943610	E	N	22,400	46,000	67,600
		N	02/19/38	73,000										
d, Ark. [11]	CSG	N	05/14/68	25,400	77,300	207	44.0	0350427	0942020	E	N	4,570	9,440	14,000
, Ark.	CONT	N	05/14/68	30,000	123,000	208	147	0350945	0942425	E	N	6,590	11,100	14,700
na, Okla.	CONT	R	05/03/90	74,600	262,000	209	1,767	0350956	0943910	E	R	22,800	39,400	52,100
eek, Ark. [1]	CSG	N	05/05/60	33,600 [b]	70,000	210	35.3	0354320	0942428	E	N	4,910	9,900	14,400
nsville, Ark.	CSG	N	10/26/70	5,120	35,000	211	8.15	0354223	0942857	E	N	1,240	2,450	3,470
near Cedarville, Ark.	CSG	N	10/26/70	274	2,110	212	0.34	0353600	0942249	E	N	34	84	139
kla. [12]	CONT	HN	04/15/45	112,000 [a,b]	170,000	213	420	0353109	0942758	E	N	23,900	41,200	55,000
		N	05/06/60	80,600										
W. Trimble Lock & Dam	CONT	N	06/19/35	418,000	861,000	214	128,306	0352056	0941754	E	N	218,000	351,000	448,000
[3]		HN	05/12/43	850,000							R	163,000	230,000	277,000
		R	05/05/90	401,000 [h]										
ver near Childress, Tex.	CONT	N	05/28/78	86,400	225,000	215	2,956	0343409	1001137	W	N	15,800	31,200	44,200
Tex.	CONT	N	05/28/78	73,500	231,000	216	3,552	0342447	0994403	W	N	20,200	35,600	47,900
e Highway 6 near Quanah, Tex.	CONT	N	10/20/83	18,000	137,000	217	303.	0342116	0994424	W	N	1,980	5,060	8,220
Okla.	CSG	N	06/01/68	830	26,200	218	10.4	0344240	0995735	W	N	129	389	674
Wellington, Tex. [14]	CONT	N	05/16/57	146,000 [b]	187,000	219	1,013	0345727	1001314	W	N	18,700	39,900	60,800
		R	04/20/77	62,100							R	6,960	20,500	36,300
Okla.	CSG	N	05/19/77	4,160	20,200	220	7.24	0345401	0995854	W	N	661	1,620	2,570
lagnum, Okla.	CONT	N	05/16/57	72,000 [a]	196,000	221	1,357	0345130	0993030	W	N	11,800	24,500	35,200
Elmer, Okla.	CONT	N	10/20/83	44,900	204,000	222	1,669	0342844	0992255	W	N	8,970	19,300	28,700
ar Shamrock, Tex.	CONT	N	06/07/67	11,200	173,000	223	703	0351551	1001429	W	R	3,500	7,430	11,300

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
		R	06/03/95	25,600	
Kelton, Tex.	CONT	N	05/20/77	2,890	131,000
Sweetwater, Okla.	CONT	HN	04/29/54	11,600	151,000
		N	06/03/95	1,940	
, Okla.	CSG	N	00/00/74	3,040	40,700
Okla.	CSG	N	05/19/77	2,450	24,000
, Okla.	CSG	N	10/09/68	2,350	46,400
ar Carter, Okla. [15]	CONT	N	05/26/59	53,400	210,000
ar Granite, Okla.	CONT	HN	05/18/35	28,000	212,000
		N	04/27/42	23,900	
low Altus Dam	CONT	HN	05/16/28	14,300	213,000
		R	05/18/51	16,100 [e]	
Red River near Carl, Okla.	CONT	N	06/03/95	62,300	151,000
ew, Okla.	CSG	N	06/02/73	2,680	49,700
Red River near Magnum, Okla.	CONT	N	05/12/47	30,600 [a]	180,000
Okla.	CONT	N	10/04/55	22,400 [a]	163,000
		R	10/03/86	28,000	
ar Headrick, Okla.	CONT	HN	05/18/35	60,000	234,000
		N	06/10/41	27,400	
		R	10/04/86	59,000	
Lk near Mountain Park, Okla.	CONT	R	06/06/53	14,200 [a]	101,000
		R	05/29/87	4,300	
ar Tipton, Okla.	CONT	R	10/05/86	57,200	237,000
ss, Tex.	CONT	N	06/05/95	28,500	214,000
ell, Tex.	CONT	N	06/06/41	106,000 [a]	218,000
, Tex.	CONT	N	10/02/83	40,500	225,000
nett, Tex.	CONT	N	06/06/95	174,000	275,000
icine Park, Okla.	CSG	N	07/03/67	2,200	11,200
Walters, Okla.	CONT	N	05/18/51	28,200 [a,e]	172,000
		R	10/21/83	50,900	
Cache, Okla.	CONT	N	08/28/77	13,600 [j]	46,100
Okla.	CSG	N	07/01/68	800	17,700
y at Manitou, Okla.	CSG	N	07/13/68	980	9,010
ndlett, Okla.	CONT	N	10/20/83	72,300	168,000
ra, Tex.	CONT	R	03/17/61	11,700	170,000
Falls, Tex.	CONT	HN	05/08/15	50,000	188,000
		R	10/03/41	17,800	
near Elgin, Okla.	CSG	N	10/20/83	3,950 [g]	18,100
Marlow, Okla.	CSG	N	05/31/68	6,400	70,100
Duncan, Okla. [16]	CONT	N	05/25/57	47,500 [a]	128,000
ika, Okla.	CONT	HN	05/18/51	65,300 [a]	187,000
		N	05/20/55	32,200	
		R	06/09/87	2,710	
, Okla. [1]	CSG	HN	05/19/55	29,500	134,000
		N	05/24/75	7,420	

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

Site number (fig. 1)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII Peak discharge f: 2 yr	5 yr	10
224	267	0352823	1000714	W	N	465	1,010	1,52
225	424	0352520	0995808	W	N	263	680	1,18
226	19.8	0351205	0994755	W	N	1,020	1,940	2,72
227	9.12	0351820	0993915	W	N	441	923	1,38
228	24.9	0351730	0993035	W	N	724	1,330	1,85
229	1,938	0351005	0993025	W	N	6,540	14,300	21,20
230	2,095	0345824	0992000	W	N	9,320	15,300	19,70
231	2,116	0345322	0991824	W	R	155	2,760	7,57
232	416	0350042	0995412	W	N	4,980	10,100	15,10
233	27.8	0350250	0994610	W	N	929	1,660	2,25
234	838	0345536	0993000	W	N	7,400	15,000	21,10
235	549	0345451	0990649	W	N	4,080	6,930	9,15
					R	5,610	11,700	17,40
236	3,845	0343804	0990547	W	N	17,600	28,000	35,90
					R	12,300	22,800	31,00
237	132	0344402	0985910	W	R	145	440	81
238	4,292	0343025	0991228	W	R	12,600	20,800	27,80
239	2,195	0341339	1000424	W	N	6,550	11,600	15,50
240	2,478	0340545	0994347	W	N	39,400	64,700	82,30
241	2,929	0341045	0991640	W	N	10,300	20,700	28,90
242	14,634	0340636	0983153	W	N	30,900	60,300	84,60
243	3.35	0344955	0983210	W	N	829	1,930	2,90
244	675	0342144	0981656	W	N	7,450	12,500	16,40
					R	5,570	12,400	19,10
245	24.6	0343724	0983348	W	N	1,780	3,650	5,26
246	6.12	0344058	0985140	W	N	142	344	53
247	2.57	0343017	0985901	W	N	373	780	1,13
248	617	0341315	0982710	W	N	7,850	17,200	25,70
249	652	0335421	0985417	W	R	2,880	5,050	6,84
250	1,054	0335434	0983200	W	R	4,130	6,910	8,80
251	6.29	0344640	0981525	W	N	730	1,790	2,86
252	35.4	0344057	0980031	E	N	807	2,000	3,33
253	158	0342935	0980650	E	N	14,100	26,700	36,70
254	563	0341300	0980257	E	N	4,030	10,200	17,10
					R	1,660	2,600	2,92
255	193	0341055	0980005	E	N	2,260	5,760	9,52
					R	3,520	7,880	12,00

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
		R	10/20/83	18,100 [g]	
ove Henrietta, Tex.	CONT	R	05/01/66	7,630	224,000
		R	05/03/90	14,200 [h]	
River near Henrietta, Tex.	CONT	N	10/13/81	32,500 [k]	131,000
kla.	CONT	N	06/06/41	197,000	546,000
		R	06/07/95	236,000	
ntary near Loco, Okla.	CSG	N	06/22/65	2,100	10,600
y, Okla.	CONT	HN	05/00/57	30,000	188,000
		N	05/03/90	49,600	
ilson, Okla.	CSG	N	04/12/67	2,300	28,200
		HN	10/00/81	6,040	
lle, Tex.	CONT	N	06/09/41	168,000	559,000
		R	05/31/87	265,000	
illan, Okla.	CSG	N	05/23/75	1,380	17,100
		HN	10/00/81	1,980 [k]	
Okla.	CSG	N	10/14/81	14,100 [k]	42,900
enne, Okla.	CONT	HN	04/03/34	52,000	178,000
		N	04/29/54	69,800	
		R	04/22/90	7,250	
6A near Cheyenne, Okla. [17]	CONT	N	05/26/59	2,710	23,300
6 near Cheyenne, Okla. [17]	CONT	N	05/23/54	18,900	41,700
4 near Cheyenne, Okla. [17]	CONT	N	04/18/57	1,160	4,090
7 near Cheyenne, Okla. [17]	CONT	N	04/29/54	6,030	25,700
erlin, Okla.	CONT	R	04/30/54	5,710	63,200
0A near Elk City, Okla. [17]	CONT	N	08/16/68	1,700	9,910
near Elk City, Okla. [17]	CONT	N	05/03/57	1,870	18,500
near Elk City, Okla. [17]	CONT	N	08/16/68	2,850	12,600
near Elk City, Okla. [17]	CONT	N	04/18/57	1,780	2,580
near Elk City, Okla. [17]	CONT	N	06/08/71	2,420	11,600
heyenne, Okla.	CONT	R	04/30/54	6,360	85,200
near Cheyenne, Okla. [17]	CONT	N	04/18/57	4,280	15,900
mon, Okla.	CONT	H	04/03/34	167,000 [l]	197,000
		R	05/17/82	6,000	
Okla.	CONT	N	04/19/57	14,000	201,000
		R	08/26/69	3,010	
on, Okla.	CONT	HN	04/03/34	90,000	210,000
		N	05/16/51	66,800 [e]	
		R	09/15/96	10,800	
ie, Okla.	CONT	N	05/18/49	50,000	227,000
		R	10/20/83	40,600	
Okla.	CONT	R	06/04/95	12,000	101,000
Okla.	CONT	N	05/20/77	7,000	67,600
obb, Okla.	CONT	HN	06/15/37	51,000	138,000
		N	05/17/49	35,000 [a]	
		R	06/23/87	1,280	
ko, Okla.	CONT	N	05/25/03	29,000	326,000

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

Site number (fig. 1)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII Peak discharge f: 2 yr	5 yr	10 y
256	1,037	0334936	0981423	E	R	1,280	3,260	5,0
257	178	0334846	0980505	E	N	1,720	5,360	9,80
258	22,787	0335243	0975603	E	R	45,200	85,300	121,00
259	1.74	0341840	0973400	E	N	483	1,080	1,6
260	572	0340015	0973400	E	N	6,260	16,200	27,30
261	5.74	0340810	0972520	E	N	1,950	2,570	3,0
262	24,846	0334340	0970935	E	R	49,600	88,800	120,00
263	2.97	0340600	0965835	E	N	760	1,100	1,30
264	12.0	0335954	0964935	E	N	2,870	5,430	7,74
265	794	0353735	0994005	W	N	5,500	15,400	26,90
					R	696	2,010	3,54
266	8.78	0352810	0994010	W	N	438	1,060	1,72
267	20.3	0352840	0993610	W	R	1,670	3,910	6,34
268	1.02	0352840	0993610	W	N	290	681	1,07
269	10.1	0353030	0993640	W	N	960	2,370	3,80
270	44.9	0353026	0993327	W	R	670	1,540	2,44
271	2.87	0352800	0993320	W	N	742	1,250	1,64
272	6.46	0352910	0993010	W	R	592	1,210	1,72
273	3.89	0352930	0992920	W	R	977	1,750	2,20
274	0.62	0353040	0993040	W	N	349	684	97
275	3.50	0352940	0993200	W	N	813	1,530	2,14
276	87.1	0353310	0993150	W	R	1,250	2,520	3,50
277	5.33	0353400	0993010	W	N	994	2,320	3,64
278	1,387	0353923	0991821	W	R	1,040	2,240	3,29
279	1,551	0353220	0991010	W	R	864	1,450	1,80
280	1,977	0353151	0985800	W	N	7,800	18,200	29,20
					R	2,090	4,090	6,00
281	3,129	0350702	0983349	W	N	9,210	17,000	23,60
					R	5,740	12,000	18,50
282	132	0351726	0983538	W	R	2,060	4,490	7,00
283	52.0	0351727	0983144	W	N	707	1,850	3,10
284	307	0350837	0982633	W	N	4,420	10,500	16,90
					R	535	1,020	1,34
285	3,656	0350503	0981435	E	N	8,720	18,300	27,40

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Documented extreme peak discharge: Date	Documented extreme peak discharge: Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
		HN	05/18/49	45,000	
		R	06/06/95	52,800	
mont, Okla.	CONT	HN	05/17/49	32,000	121,000
		N	10/04/59	1,260	
		R	09/21/65	8,500	
r 131 near Anadarko, Okla.	CONT	R	05/31/77	1,201	74,200
na, Okla.	CONT	N	04/12/67	4,900	58,800
at Chickasha, Okla.	CONT	N	08/28/65	2,010	83,200
Tabler, Okla.	CONT	N	04/12/67	3,300	87,600
er, Okla.	CONT	N	00/00/73	98	1,830
abler, Okla.	CONT	R	05/24/73	4,620	69,900
r Ninnekah, Okla. [18]	CONT	HN	05/16/47	36,000	137,000
		HN	05/24/57	25,200	
		N	05/10/64	9,360	
		R	10/20/83	9,380 [g]	
er, Okla.	CONT	HN	04/07/27	53,600	353,000
		N	05/20/49	50,000	
		HN	05/00/57	48,300	
, Okla.	CSG	R	05/09/64	2,450	33,600
ex, Okla.	CSG	R	07/01/68	280	5,580
Okla.	CONT	R	05/27/78	6,080	68,000
kla.	CONT	R	06/08/95	25,000	355,000
s Valley, Okla.	CONT	N	05/18/57	35,800	366,000
		R	05/29/87	43,600	
la.	CONT	N	05/10/50	30,000	122,000
		R	05/28/87	17,000	
lle, Okla. [19]	CONT	N	05/18/57	38,500	137,000
		R	05/21/79	17,600	
Hoover, Okla.	CONT	R	05/03/90	40,600	191,000
, Okla.	CSG	N	10/13/81	16,200 [k]	53,000
Okla.	CONT	R	04/26/90	10,400	77,300
erty, Okla.	CONT	N	05/17/57	25,600	120,000
		HR	10/08/70	80,000	
ore, Okla.	CONT	N	03/15/45	22,300 [a]	154,000
son, Okla.	CONT	HN	05/00/08	71,000	398,000
		N	05/11/43	91,300	
		R	05/03/90	118,000 [h]	
gan, Okla.	CSG	N	05/13/68	1,040	23,100
am near Denison, Tex. [20]	CONT	N	05/21/35	201,000	608,000
		R	06/05/57	102,000	
		HR	05/06/90	145,000 [i]	
, Okla.	CSG	N	04/21/67	1,090	4,610
Okla.	CONT	N	10/08/70	35,100	137,000
kla.	CONT	N	10/14/81	65,200 [k]	177,000
Randolph, Tex.	CONT	N	05/13/82	19,200	131,000

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

Site number (fig. 1)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII Peak discharge f 2 yr	5 yr	10 y
285					R	4,640	10,400	17,30
286	208	0351030	0981520	W	N	1,260	2,930	4,69
					R	1,480	3,520	5,73
287	40.1	0350325	0981041	E	R	359	791	1,14
288	23.8	0350844	0975703	E	N	719	1,640	2,58
289	52.0	0350318	0975711	E	N	437	998	1,55
290	59.4	0350300	0975100	E	N	1,670	3,110	4,33
291	0.30	0350441	0974710	E	N	30	48	6
292	35.2	0350238	0974928	E	N	1,740	3,020	4,05
293	208	0345641	0975708	E	N	3,320	7,510	11,90
					R	2,900	4,750	6,20
294	4,706	0345818	0975221	E	N	11,800	22,900	32,50
295	7.57	0345644	0975018	E	R	337	794	1,31
296	0.88	0345706	0975048	E	R	153	216	25
297	33.0	0345935	0974540	E	R	1,210	2,970	4,58
298	4,787	0345533	0974625	E	R	7,710	12,900	16,70
299	5,330	0344517	0971504	E	N	14,000	21,400	26,20
					R	11,400	18,800	24,40
300	145	0344146	0973555	E	N	10,000	16,100	21,10
					R	3,570	6,980	10,00
301	206	0344436	0972418	E	N	9,260	17,700	25,50
					R	5,510	9,800	13,20
302	604	0343239	0971449	E	R	11,600	19,800	25,80
303	18.7	0342650	0970740	E	N	1,990	4,520	7,12
304	44.1	0342943	0965918	E	R	5,100	7,100	8,54
305	138	0342350	0970210	E	N	4,510	10,500	16,90
306	298	0341433	0970628	E	N	8,150	15,500	21,90
307	7,202	0341400	0965832	E	N	22,700	41,200	56,10
					R	29,500	46,700	59,10
308	4.30	0341950	0963928	E	N	465	711	89
309	33,784	0334908	0963347	E	N	87,000	140,000	177,00
					R	30,400	52,700	68,90
310	0.72	0334835	0962238	E	N	396	683	92
311	203	0341502	0963255	E	N	8,630	17,200	24,60
312	476	0335949	0961427	E	N	9,400	17,500	24,80
313	178	0332832	0961252	E	N	8,220	12,600	15,50

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least 8 years of annual peak-discharge data from unregulated, regulated, and urban basins within and

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Documented extreme peak discharge: Date	Documented extreme peak discharge: Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 1)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII Peak discharge f: 2 yr	LPIII Peak discharge f: 5 yr	LPIII Peak discharge f: 10 y
ary near Stringtown, Okla.	CSG	N	04/20/71	4,930	18,200	314	3.19	0342933	0955639	E	N	1,610	3,400	5,1
		HN	10/00/81	6,320 [k]										
tringtown, Okla. [21]	CSG	N	10/14/62	18,800 [b]	67,700	315	32.7	0342741	0960136	E	N	7,580	10,800	13,10
gtown, Okla. [21]	CSG	N	11/24/73	11,100	101,000	316	86.6	0342633	0955210	E	N	6,660	8,870	10,30
ar Farris, Okla.	CONT	N	06/17/45	61,900 [a]	227,000	317	1,087	0341617	0955443	E	N	19,500	29,400	36,70
		R	05/05/90	49,800 [h]							R	14,700	21,500	28,30
Caney, Okla.	CONT	HN	02/00/38	54,600 [a]	202,000	318	720	0341509	0961219	E	N	14,000	28,600	42,20
		N	12/11/46	52,800							R	11,000	18,200	23,80
		R	10/14/81	53,500 [k]										
ar Unger, Okla.	CONT	N	05/06/90	76,700 [h]	282,000	319	2,273	0340136	0954500	E	N	20,900	32,900	42,10
ll, Okla.	CSG	N	05/13/68	550	5,940	320	0.94	0335757	0955202	E	N	250	428	56
ber, Okla.	CSG	N	10/30/74	5,840	50,100	321	16.6	0340220	0954010	E	N	3,230	5,100	6,44
, Tex.	CONT	N	05/28/08	400,000	630,000	322	38,595	0335230	0953006	E	N	80,600	146,000	202,00
		R	05/04/90	275,000 [h]							R	57,300	86,500	111,00
Cedar, Okla. [22]	CONT	N	05/19/90	27,400	74,200	323	40.1	0343818	0943645	E	N	9,330	14,700	18,40
y near Albion, Okla.	CSG	N	12/09/71	1,070	8,810	324	1.43	0343740	0950250	E	N	222	538	86
yton, Okla.	CONT	R	05/04/90	40,200 [h]	201,000	325	708	0343432	0952026	E	R	17,000	22,700	26,80
er, Okla. [1]	CSG	N	03/28/77	10,600	92,400	326	68.0	0341755	0954440	E	N	3,620	5,080	6,13
lers, Okla. [22]	CONT	N	03/28/77	50,000	230,000	327	1,138	0341455	0953618	E	N	28,200	37,400	42,70
		R	05/03/90	62,300 [h]							R	27,500	37,700	44,70
zoni, Okla.	CONT	HN	10/00/15	72,000 [a]	246,000	328	1,423	0341202	0952903	E	N	34,500	49,400	59,40
		N	02/18/38	71,400										
, Okla.	CSG	N	11/01/84	7,400	54,000	329	19.4	0341150	0952100	E	N	2,500	4,570	6,22
r, Okla.	CSG	N	12/09/71	1,560	19,100	330	3.39	0340150	0952130	E	N	790	1,170	1,44
anawha, Tex.	CONT	N	12/10/71	30,200	96,400	331	75.4	0335026	0951555	E	N	5,890	10,100	13,50
Okla.	CSG	N	04/22/64	4,400	33,500	332	7.53	0335344	0945315	E	N	2,220	3,020	3,58
rvin, Okla.	CSG	N	12/09/71	1,270	17,100	333	2.96	0335344	0945423	E	N	726	1,020	1,21
sville, Tex. [23]	CONT	N	12/10/71	21,300	107,000	334	100	0334107	0945941	E	N	4,280	7,210	9,50
Tex.	CONT	HR	06/07/57	205,000	642,000	335	41,412	0334059	0944139	E	R	72,300	110,000	140,00
		R	05/06/90	279,000 [h]										
d, Okla.	CSG	N	10/31/72	1,540	12,000	336	1.99	0341027	0950433	E	N	450	857	1,20
City, Okla.	CONT	N	05/06/61	78,200	195,000	337	645	0340410	0950247	E	N	30,500	49,700	64,10
		R	12/10/71	11,200 [m]							R	6,460	7,840	8,74
r, Okla.	CONT	HN	05/00/61	88,200	156,000	338	315	0340551	0945407	E	N	28,000	44,300	56,40
		N	12/10/71	98,600 [m]										
ta Creek near Idabel, Okla. [24]	CONT	HN	02/00/38	86,000	235,000	339	1,226	0335628	0944530	E	N	27,500	46,100	60,10
		N	09/17/50	66,100							R	12,300	19,300	27,80
		R	12/10/71	103,000 [m]										
oken Bow, Okla.	CSG	N	05/03/84	4,700	37,200	340	9.10	0340345	0944422	E	N	1,780	3,110	4,1
tfield, Ark.	CSG	N	05/13/68	6,260	49,100	341	15.9	0343052	0942014	E	N	1,960	3,530	4,87
ville, Okla.	CONT	N	10/06/98	46,500	157,000	342	320	0342744	0943806	E	N	26,300	35,800	42,10
y near Smithville, Okla.	CSG	N	05/13/82	1,030	5,390	343	0.85	0342948	0944006	E	N	199	356	48
letown, Okla.	CONT	HN	08/18/15	92,000 [a]	207,000	344	787	0340230	0943711	E	N	39,400	64,400	82,30
		N	05/20/60	101,000 [b]							R	9,260	11,800	13,80
		R	06/02/90	18,200										

peak discharges and flood frequency estimates for selected streamflow-gaging stations with at least

ation name	Type of station (CONT/ CSG)	Documented extreme peak discharge: Type of record (H/ I/N/ R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)
een, Ark. [25]	CSG	HN	08/27/47	110,000 [a,b]	132,000
		N	12/10/71	71,000	
		R	05/17/82	6,320	
neen, Ark.	CSG	N	05/13/68	6,240	30,300
, Ark.	CONT	HN	08/00/15	124,000 [a]	296,000
		N	03/30/45	120,000	
		R	12/10/71	65,100	
remean, Ark.	CSG	N	12/02/82	3,800	40,700
dervoort, Ark.	CONT	HN	05/06/61	48,000	102,000
		N	12/02/82	32,000	
Queen, Ark. [25]	CSG	N	05/13/68	122,000	162,000
		R	07/02/83	22,600	
ear Lockesburg, Ark.	CSG	N	12/26/82	719	4,090
ata, Tex.	CONT	N	12/10/71	20,400	93,000

990)

rom nearby station 07161000
rom nearby station 07174000
r nearby station 07188000

ame year as that for nearby station 07196500 for unregulated streamflow period
r nearby station 07230500 for unregulated streamflow period
in Wahl and Tortorelli (1997)
for nearby station 07241000
or nearby station 07249400
., prior to WY 1993
Ark., prior to WY 1970
ame year as that for nearby station 07299850 for unregulated streamflow period
from nearby station 07302000
for nearby station 07313500
water retarding structure
from nearby station 07327500, not shown in table

from nearby station 07332000, not shown in table

8 years of annual peak-discharge data from unregulated, regulated, and urban basins within an

Site number (fig. 1)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/ W)	Type basin (N/ I/R/ U)	LPIII Peak discharge f: 2 yr	5 yr	10 y
345	182	0340251	0942447	E	N	15,700	31,200	45,30
					R	2,300	3,370	4,29
346	6.41	0340244	0941813	E	N	961	2,400	3,84
347	2,662	0335510	0942315	E	N	46,400	71,300	89,20
					R	25,800	35,300	41,50
348	10.7	0334513	0942328	E	N	1,540	2,650	3,49
349	89.6	0342246	0941408	E	N	14,600	25,400	33,80
350	360	0340245	0941242	E	N	27,800	46,600	61,80
					R	8,080	13,200	16,80
351	0.64	0335804	0941125	E	N	189	337	46
352	69.0	0333251	0951022	E	N	4,740	7,580	9,80

[21] Continuous-record gage prior to WY 1969
[22] Historical record length assumed to start from same year as that for nearby station 07336500 for unr
[23] Historical record length assumed to start from same year as that for nearby station 07335500 for reg
[24] Frequency analysis includes streamflow record from nearby station 07338000, not shown in table
[25] Continuous-record gage prior to WY 1980

peak discharges for selected indirect measurement sites without streamflow-gaging stations and streamflow-gaging stations with short periods of record in basins within Oklahoma

feet per second; mi^2, square miles; E, sites east of 98 degrees 15 minutes longitude; W, sites west of 98 degrees 15 minutes longitude; Ck, Creek; Ave, Avenue; SW, southwest; Trib, Tributary; NW, northwe

r indirect measurement site name	Documented extreme peak discharges			Potential extreme peak discharge (ft^3/s) (table 4)
	Type basin (N/R/U)	Date	Discharge (ft^3/s)	
edom, Okla.	N	05/16/57	14,600	50,600
saw, Okla.	N	05/12/50	442,000	856,000
	R	05/27/57	544,000	
	R	04/09/65	110,000	
ho, Okla.	N	05/16/51	7,700	127,000
ear Arapaho, Okla.[1]	N	05/16/51	2,990	7,780
ear Arapaho, Okla.	N	05/16/51	1,590	3,320
Okla.	N	05/19/43	29,000	135,000
rber, Okla. [2]	N	10/10/73	10,300	57,100
kedee, Okla.	N	05/19/43	22,000	190,000
ek near Page, Okla.	N	11/05/94	19,600	95,800
Okla.	N	4/19/76	6,170	43,000
Hefner near Oklahoma City, Okla.	U	06/16/55	1,070	9,910
City, Okla.	U	05/20/77	1,640	10,000
Road at Enid, Okla. [2]	U	10/10/73	8,730	31,800
al below Rupe Ave in Enid, Okla. [2]	N	10/10/73	13,200	43,500
Okla.	N	10/20/84	4,220	93,000
Street at Oklahoma City, Okla. [3]	U	05/08/93	12,000	24,800
Street at Oklahoma City, Okla. [3]	U	05/08/93	10,000	18,400
Street at Oklahoma City, Okla. [3]	U	05/08/93	8,000	13,300
36th East Ave Bridge at Tulsa, Okla. [4]	U	05/27/84	5,910	13,000
ity, Mo.[1]	N	05/18/43	23,000	99,500
castle, Okla.	N	05/04/41	200,000	535,000
f Wauhillau, Okla.	N	05/00/43	17,000	96,400
Geary, Okla.	N	09/21/65	6,150	28,500
e Drive, The Village, Okla.	U	05/20/77	2,800	11,500
.	U	07/23/63	4,000	35,500
Okla. [5]	N	10/00/81	3,930	35,800
near Dewar, Okla.	N	05/16/45	6,820	66,600
st Ave at Tulsa, Okla. [4]	U	05/27/84	4,160	12,800
ate 44 and 129th East Ave at Tulsa, Okla. [4]	U	05/27/84	5,040	13,500
, Okla. [1, 6]	N	04/14/45	11,000	39,500
Guthrie, Okla. [7]	N	05/19/49	44,000	161,000
Navina, Okla.	UR	09/13/89	40,300	144,000
ne, Okla.[1]	N	05/10/50	43,200	90,800
ntain View, Okla.	N	05/18/49	5,800	20,600

Site number (fig. 2)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)
353	28.7	0364521	0990539	W
354	125,516	0352058	0944816	E
355	243	0353450	0990235	W
356	2.16	0353450	0990131	W
357	0.81	0353818	0985918	W
358	195	0363753	0961429	E
359	22.2	0362330	0974030	E
360	590	0362023	0964232	E
361	74.4	0345246	0943040	E
362	12.1	0350226	0953421	E
363	1.62	0353233	0973546	E
364	1.64	0353226	0973556	E
365	6.91	0362325	0975440	E
366	12.4	0362225	0975400	E
367	69.1	0350121	0945639	E
368	4.74	0352607	0973253	E
369	3.24	0352514	0973259	E
370	2.24	0352422	0973315	E
371	2.17	0360720	0944930	E
372	82.0	0364043	0943537	E
373	20,962	0351803	0973554	E
374	75.4	0354753	0945118	E
375	11.8	0353255	0981550	W
376	1.90	0353356	0973326	E
377	8.18	0361224	0955448	E
378	8.50	0342706	0961356	E
379	31.4	0352815	0955414	E
380	2.14	0360948	0955000	E
381	2.26	0360932	0954956	E
382	10.0	0351303	0963048	E
383	353	0355013	0972625	E
384	247	0354636	0973245	E
385	65.0	0342420	0975630	E
386	7.45	0350542	0984543	W

peak discharges for selected indirect measurement sites without streamflow-gaging stations and streamflow-gaging stations with short periods of record in basins within Oklahoma—Continued

ion name and location	Documented extreme peak discharges: Type basin (N/R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 2)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)
Okla.	N	05/17/57	12,600	85,000	387	55.0	0345303	0973140	E
Roll, Okla.	N	04/29/54	8,410	55,000	388	33.8	0354654	0994243	W
trong City, Okla. [8]	N	4/3-4/34	17,000	69,900	389	56.0	0354056	0993750	W
dependence, Oklahoma City, Okla.	U	11/02/74	3,940	22,000	390	4.02	0353018	0973428	E
reet Culvert, Oklahoma City, Okla.	U	11/02/74	4,100	28,500	391	5.83	0353041	0973323	E
e., Oklahoma City, Okla.	U	05/20/77	4,130	17,200	392	2.98	0353006	0973458	E
kla.[1]	N	05/18/43	42,000	227,000	393	1,093	0354111	0963943	E
ity, Okla. [1]	N	05/16/51	46,400	86,600	394	90.2	0354155	0984940	W
ek, Okla. [2]	N	10/11/73	36,400	83,900	395	53.1	0364808	0973010	E
Okla.	N	06/00/48	70,000	138,000	396	308	0353234	0983206	W
r Custer City, Okla.[1]	N	05/16/51	7,030	19,100	397	6.74	0354112	0985036	W
o, Okla. [1]	N	06/22/48	31,000	134,000	398	280	0353233	0983518	W
panucka, Okla. [5]	N	10/00/11	13,700	78,700	399	45.8	0342430	0962515	E
ary at Mohawk Road at Tulsa, Okla. [4]	U	05/27/84	2,920	15,900	400	2.74	0361158	0955815	E
Okla.[1]	N	10/04/55	8,170	26,000	401	10.3	0352830	0990245	W
e, Okla.	N	05/18/55	5,320	50,700	402	17.0	0342144	0980108	E
t, Okla.[1]	N	05/00/43	20,000	122,000	403	144	0354326	0964439	E
armen, Okla.[1]	N	05/16/57	31,800	138,000	404	306	0363444	0983037	W
ear Moorewood, Okla. [8]	N	04/03-04/34	6,300	12,900	405	4.00	0354509	0992339	W
er Creek near Moorewood, Okla. [8]	N	04/03-04/34	54,500	61,300	406	42.0	0354333	0992109	W
reek near Elk City, Okla.	N	04/29/54	1,340	14,600	407	4.73	0353129	0993156	W
Bowlegs, Okla. [1, 6, 9]	N	04/14/45	3,000	5,640	408	0.89	0351440	0963354	E
r, Okla.	N	10/31/72	968	7,640	409	1.23	0340633	0945542	E
ear Boise City, Okla.	N	08/21/65	2,700	15,500	410	5.15	0364620	1024816	W
Reno, Okla.[1]	N	11/19/53	6,390	35,900	411	8.51	0353220	0975249	E
gs, Okla.	R	05/10/50	20,100	101,000	412	87.0	0353653	0951023	E
rdesty, Okla.[1]	R	05/16/55	22,100	95,400	413	116	0363259	1010948	W
aukomis, Okla.	N	05/16/57	16,500	66,300	414	31.0	0361513	0974802	E
et in Tulsa, Okla.	N	05/27/84	6,040	27,300	415	5.45	0360154	0955019	E
etta, Okla. [5]	N	10/13-14/81	68,100	112,000	416	116	0340046	0970459	E
linsville, Okla.	N	05/22/53	2,540	36,000	417	8.55	0362316	0955304	E
Okla.	N	05/16/57	6,800	61,600	418	26.4	0361446	0981145	E
ssa, Okla.[1]	N	05/18/43	15,800	45,200	419	13.4	0364734	0945212	E
eet South at Tulsa, Okla. [4]	U	05/27/84	23,000	47,200	420	14.6	0360339	0955801	E
r, Okla.	R	05/10/50	459	11,200	421	1.85	0352930	0952040	E
, Okla.	N	05/08/50	11,200	51,200	422	17.4	0362328	0980355	E

peak discharges for selected indirect measurement sites without streamflow-gaging stations and streamflow-gaging stations with short periods of record in basins within Oklahoma—Continued

ion name and location	Documented extreme peak discharges			Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 2)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)
	Type basin (N/R/U)	Date	Discharge (ft^3/s)						
Pump Station near Jennings, Okla.[1]	N	09/04/40	43,600	80,700	423	48.3	0360853	0963533	E
en, Okla.[10, 11]	R	05/00/90	430,000	627,000	424	37,822	0351825	0952145	E
kla.[10, 11]	N	05/00/90	120,000	259,000	425	1,709	0340042	0952249	E
Farris, Okla.[10, 11]	N	05/00/90	32,000	131,000	426	178	0341852	0955230	E
ar Dougherty, Okla.[10, 12]	R	10/08-09/70	80,000	116,000	427	126	0342550	0970150	E
, Okla.[10, 11]	N	05/00/90	114,000	150,000	428	275	0343745	0952103	E
Okla.[10, 11]	N	05/00/90	70,000	255,000	429	1,610	0353548	0950257	E
on, Tex.[10, 11]	R	05/00/90	300,000	608,000	430	33,784	0334905	0963420	E
oka, Okla.[6]	R	04/14/45	9,700	49,300	431	16.0	0351037	0963137	E
Okla.[10, 11]	N	05/00/90	100,000	222,000	432	993	0345612	0944310	E
ry, Okla.	N	06/22/48	2,410	3,440	433	0.84	0353641	0982540	W
Avenue at Oklahoma City, Okla.[3]	U	05/08/93	15,000	44,000	434	12.7	0352541	0973046	E
Street at Oklahoma City, Okla.[3]	U	05/08/93	10,000	35,700	435	8.42	0352500	0973100	E
th Street at Oklahoma City, Okla.[3]	U	05/08/93	15,000	46,100	436	13.9	0352621	0973043	E
0th Street at Oklahoma City, Okla.[3]	U	05/08/93	15,000	45,500	437	13.6	0352606	0973050	E
4th Street at Oklahoma City, Okla.[3]	U	05/08/93	10,000	41,800	438	11.4	0352514	0973050	E
1st Street at Oklahoma City, Okla.[3]	U	05/08/93	10,000	35,000	439	8.12	0352451	0973105	E
0th Street in Oklahoma City, Okla.	U	05/29/70	4,840	46,700	440	14.3	0352644	0973033	E
4th Street in Oklahoma City, Okla.	U	05/29/70	2,720	21,700	441	3.96	0352328	0973136	E
pew, Okla.	N	05/09/43	17,000	93,400	442	69.9	0354822	0962930	E
omas, Okla.[1]	N	05/16/51	6,230	15,100	443	4.96	0354516	0984839	W
n, Okla.[1]	N	05/16/57	17,300	61,300	444	42.0	0364244	0990708	W
, Okla.	N	03/27/77	36,000	130,000	445	176	0341854	0955230	E
etwater, Okla.	N	04/29/54	1,210	32,100	446	14.0	0352944	0995930	W
nid, Okla.	U	07/29/50	5,830	43,400	447	12.3	0362327	0975345	E
rk at Tulsa, Okla.[4]	U	05/27/84	12,300	14,700	448	2.50	0360900	0955322	E
kla.[13]	N	10/08/70	15,300	102,000	449	89.2	0341535	0964837	E
Okla.[5]	N	10/16/81	29,800	173,000	450	445	0342323	0960712	E
o, Okla.	N	09/20/65	1,740	12,500	451	3.84	0342700	0993210	W
mmon, Okla.[8]	N	04/03-04/34	36,000	61,300	452	42.0	0353831	0992754	W
id, Okla.[2]	U	10/10/73	10,200	32,500	453	7.17	0362400	0975224	E
near Blanchard, Okla.	N	05/28/49	36,400	81,400	454	49.2	0350951	0973651	E
nulgee, Okla.[6]	R	04/14/45	11,000	74,200	455	40.1	0353717	0960342	E
k at Lahoma Road at Enid, Okla.[2]	U	10/10/73	1,660	2,380	456	0.38	0362327	0975340	E
lt (at Narrows), Okla.	N	06/05/53	16,300	64,600	457	47.0	0344910	0990137	W
Roosevelt, Okla.	N	06/05/53	2,670	11,500	458	3.45	0345156	0990131	W

peak discharges for selected indirect measurement sites without streamflow-gaging stations and streamflow-gaging stations with short periods of record in basins within Oklahoma— Continued

ion name and location	Documented extreme peak discharges			Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 2)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)
	Type basin (N/R/U)	Date	Discharge (ft^3/s)						
la.	N	05/10/50	4,740	28,600	459	5.85	0345135	0971555	E
sville, Okla.[1]	N	05/19/43	5,500	33,400	460	7.50	0364158	0960246	E
lpa, Okla.	N	09/03/40	51,600	141,000	461	229	0355719	0960707	E
ear Jefferson, Okla. [2]	N	10/11/73	24,300	130,000	462	173	0364325	0974745	E
ne, Okla. [14]	N	08/27/71	23,000	106,000	463	148	0343125	0983757	W
Okla. [15]	R	05/03/90	74,600	262,000	464	1,767	0350956	0943910	E
ear Mountain View, Okla. [1]	N	05/17/49	38,000	139,000	465	316	0350554	0984334	W
Tributary West of Mountain View, Okla.	N	05/17/49	3,300	9,100	466	2.60	0350515	0984704	W
Okla. [1, 9]	N	09/04/40	32,400	50,800	467	17.1	0361736	0963409	E
ter, Okla. [2]	N	10/11/73	55,700	87,600	468	59.4	0363130	0973955	E
, Okla. [6]	N	04/14/45	5,600	25,800	469	5.00	0351022	0964011	E
Okla. [12]	N	10/08/70	27,800	73,400	470	39.2	0343056	0965806	E
e 9, near Sulphur, Okla. [10, 13]	N	10/08/70	6,350	7,350	471	1.18	0343143	0965755	E
Okla. [1]	N	04/29/54	53,700	77,600	472	69.6	0354045	0995100	W
0 near Enid, Okla. [2]	N	10/10/73	12,400	48,600	473	15.5	0362327	0975913	E
r Cheyenne, Okla. [8]	N	04/04/34	52,100	56,800	474	36.0	0353633	0994043	W
kla. [2]	N	10/10/73	24,100	51,100	475	17.3	0362451	0974916	E
ggy Creek near Enid, Okla. [2]	U	10/10/73	60,600	94,100	476	71.1	0362135	0974815	E
id, Okla. [1]	U	05/16/57	3,750	20,300	477	3.66	0362231	0975324	E
r Guymon, Okla.	N	04/30/82	81	972	478	0.26	0364006	1012954	W
vinaw, Okla. [1]	R	04/19/41	86,400	166,000	479	386	0362301	0950313	E
k Lane, Oklahoma City, Okla.	U	11/02/74	3,440	30,400	480	6.42	0353322	0973718	E
st Highway, Oklahoma City, Okla.	U	11/02/74	2,060	13,600	481	2.28	0353305	0973717	E
d Dam, Oklahoma City, Okla.	U	11/02/74	3,000	32,400	482	7.10	0353431	0973724	E
y, Okla.	N	05/28/70	927	3,780	483	0.93	0352425	0993305	W
mont, Okla.	N	05/08/93	4,500	69,200	484	34.4	0351121	0981054	E
Grove, Okla.	N	05/10/50	41,200	112,000	485	116	0360853	0950929	E
on, Okla.	N	05/08/93	2,240	57,000	486	22.1	0351121	0980735	E
e, Okla.	N	05/18/43	9,700	71,800	487	37.3	0365640	0945114	E
ur, Okla. [13]	N	10/08/70	16,500	17,300	488	3.00	0343003	0965725	E
way 169 at Tulsa, Okla. [4]	U	05/26-27/84	9,540	19,700	489	3.53	0360906	0955136	E
ssey, Okla. [2]	N	10/11/73	52,700	166,000	490	385	0360338	0975550	E
Washita River near Arapaho, Okla.	N	05/16/51	10,900	35,300	491	16.1	0353403	0985411	W
treet at Oklahoma City, Okla. [3]	U	05/08/93	10,000	18,400	492	3.23	0352606	0973358	E
treet at Oklahoma City, Okla. [3]	U	05/08/93	6,000	15,900	493	2.73	0352514	0973405	E
ue Beaver Creek, Cache, Okla. [14]	N	08/27-28/77	933	1,870	494	0.45	0343751	0983323	W

peak discharges for selected indirect measurement sites without streamflow-gaging stations and streamflow-gaging stations with short periods of record in basins within Oklahoma—Continued

ion name and location	Documented extreme peak discharges: Type basin (N/R/U)	Date	Discharge (ft^3/s)	Potential extreme peak discharge (ft^3/s) (table 4)	Site number (fig. 2)	Contributing drainage area (mi^2)	Latitude	Longitude	Hydrologic region (E/W)
master Ck near Moorewood, Okla. [8]	N	04/03-04/34	18,100	41,000	495	20.0	0354148	0991833	W
eeyah, Okla.	N	05/21/43	138,000	345,000	496	4,402	0362330	0954015	E
eyville, Okla. [5]	N	10/13-14/81	29,600	156,000	497	314	0335630	0971820	E
Grove, Okla. [1]	N	05/17/57	63,000	118,000	498	133	0340911	0971945	E
ia, Okla.	N	05/18/43	4,200	42,900	499	12.0	0365546	0943905	E
ll, Okla. [8]	N	04/04/34	65,000	213,000	500	2,160	0352058	0985126	W
Arapaho, Okla. [8]	N	04/03-04/34	16,600	111,000	501	112	0353819	0990501	W
Creek near Cache, Okla. [14]	N	08/27-28/77	6,370	14,400	502	4.67	0343801	0983622	W
near Moorewood, Okla. [8]	N	04/03-04/34	9,400	48,700	503	27.0	0354509	0992423	W
er Creek near Moorewood, Okla. [8]	N	04/03-04/34	34,300	88,600	504	61.0	0353924	0971820	E
er Creek near Moorewood, Okla. [8]	N	04/03-04/34	67,400	92,400	505	107	0354215	0992236	W
ache, Okla. [14]	N	08/28/77	13,600	73,900	506	63.1	0343609	0983757	W
axon, Okla. [14]	N	08/28/77	45,700	135,000	507	285	0342746	0983413	W
Okla. [1, 6]	N	04/14/45	88,000	96,200	508	75.0	0351026	0963633	E
lsdale, Okla. [2]	N	10/10/73	6,280	26,100	509	5.08	0363305	0975440	E
kins, Okla.	N	05/20/57	23,000	72,400	510	38.1	0355907	0970707	E
nd Creek, Okla. [2]	N	10/11/73	102,000	112,000	511	116	0363723	0974736	E
ma, Okla.	N	05/19/55	19,300	111,000	512	112	0342906	0974144	E
Okla. [1]	N	05/10/50	5,890	21,300	513	3.87	0342841	0975708	E
, Okla.	N	05/20/77	12,000	50,800	514	28.9	0351400	0982757	W

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